Audit and Review Report for Plant Aging Management Reviews and Programs

Nine Mile Point Nuclear Station, Units 1 and 2
Docket Nos.: 50-220 and 50-410

January 5, 2006

Prepared by
Information Systems Laboratories, Inc.
11140 Rockville Pike
Rockville, MD 20852

Contract No. GS-23F-0060L

Prepared for
License Renewal and Environmental Impacts Program
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Nine Mile Point Audit and Review Report

Table of Contents

Nine Mile Point Audit and Review Report

Audit and Review Report for Plant Aging Management Reviews and Programs
Nine Mile Point - Units 1 and 2

1.0 Introduction and General Information

1.1 Introduction

By letter dated May 26, 2004 (Agencywide Documents Access and Management System [ADAMS] Accession Number ML041490213), Nine Mile Point Nuclear Station, LLC (NMPNS, the applicant) submitted to the U.S. Nuclear Regulatory Commission (NRC) its application for renewal of Unit 1 Operating License DPR-63 and Unit 2 Operating License NPF-69 for Nine Mile Point (NMP) Nuclear Station (ML041490223). The applicant requested renewal of the operating licenses for an additional 20 years beyond the 40-year current license term.

In a letter dated March 3, 2005 (ML050680270), the applicant requested a grace period to recover the quality of the license renewal application (LRA) for NMP Units 1 and 2. This action temporarily suspended the formal review of the LRA. In a letter dated July 14, 2005 (ML052000163), the applicant submitted an amended LRA addressing all issues that had been communicated by the NRC staff as well as a number of areas identified by the applicant as in need of enhancement. The amended LRA is not a new or revised application, but rather an enhancement to the original LRA submitted by the applicant on May 26, 2004. In the remainder of this audit and review report, the amended LRA will be referred to simply as the ALRA. If there is a reason to refer to the original LRA in the text of the audit and review report, it will be referred to as the LRA.

In a letter dated August 19, 2005 (ML052500572), the applicant reformatted Sections 3.1.2, 3.2.2, 3.3.2, 3.4.2, 3.5.2 and 3.6.2 of the NMP ALRA to add new 3.X.2.C sections. These sections contain the applicant’s further evaluation information. This information was evaluated by the project team and documented in this audit and review report.

In support of the staff's safety review of the ALRA for NMP Units 1 and 2, the License Renewal and Environmental Impacts Program, Section B (RLEP-B), led a project team that audited and reviewed selected aging management reviews (AMRs) and associated aging management programs (AMPs) developed by the applicant to support the LRA for NMP Units 1 and 2. The project team included both NRC staff and contractor personnel provided by Information Systems Laboratories, Inc. (ISL), RLEP-B technical contractor. Attachment 2 lists the project team members as well as other NRC staff and ISL personnel who supported the project team’s review.

The project team performed its work in accordance with the requirements of Title 10 of the Code of Federal Regulations (CFR), Part 54 (10 CFR Part 54), “Requirements for Renewal of Operating Licenses for Nuclear Power Plants;” the guidance provided in NUREG-1800, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants” (SRP-LR); and the guidance provided in NUREG-1801, “Generic Aging Lessons Learned (GALL) Report,” (GALL Report).

Details of how the project team implemented these requirements and guidance are found in "Audit and Review Plan for Plant Aging Management Programs and Reviews - Nine Mile Point Nuclear Station, Units 1 and 2," Docket Nos. 50-220 and 50-410 (ML052780304) (NMP audit and review plan).

Overall, for its assigned scope of work, the project team determined that the applicant's aging management activities and programs will adequately manage the effects of aging on systems, structures and components, so that their intended functions will be maintained for Nine Mile Point Nuclear Station, Units 1 and 2 for the period of extended operation.

This audit and review report documents the results of the project team's audit and review work. The project team performed its work at NRC Headquarters, Rockville, Maryland; at ISL offices in Rockville, Maryland; and at the applicant's offices at the NMP plant site in Oswego, New York and corporate office in Crofton, Maryland. The project team conducted on-site visits during the weeks of September 19, 2005 and October 24, 2005. The project team conducted a public exit meeting at the applicant's offices in Oswego, New York, on November 18, 2005. Attachment 2 lists the applicant personnel and other individuals contacted by the project team in support of the work documented in this audit and review report. It also lists those attending the public exit meeting.

1.2 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, or (3) that are relied on to demonstrate compliance with NRC 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, and that are not subject to replacement based on qualified life or specified time period. 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 for the period of extended operation. 10 CFR 54.21(d) requires that the applicant submit a supplement to the Final Safety Analysis Report (FSAR) that contains a summary description of the programs and activities for managing the effects of aging.

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 of a large number of SCs that are subject to an AMR. It summarizes the aging management evaluations, programs, and activities credited for managing aging for most of the SCs used by commercial nuclear power plants, and serves as a reference for both the applicant and project team reviewers to quickly identify those AMPs and activities that the project team 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) aging effects 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 project team 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 project team will accept the applicant's reference to the GALL Report. In making this determination, the project team considers whether the applicant has identified specific programs described and evaluated in the GALL Report but does not conduct a review of the substance of the matters described in the GALL Report. Rather, the project team 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 the 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 verifications and that those verifications are documented and retained by the applicant in an auditable form.

1.3 Summary of Information in the NMP License Renewal Application

The NMP LRA closely follows the standard LRA format presented in Nuclear Energy Institute (NEI) guidance, NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule," Revision 4, April 2001. Section 3 of the NMP LRA provides the results of the AMPs for SCs that the applicant identified as subject to an AMR.

1.3.1 NMP Unit 1 License Renewal Application Tables

NMP Unit 1 ALRA Tables 3.0-1 and 3.0-2 provide descriptions of the internal and external service environments, respectively, for the mechanical, electrical, and structures and component supports used in the AMRs to determine the aging effects/mechanisms requiring management. Results of the AMRs are presented in two table types.

The first table type is Table 3.X.1.A, where the 3 indicates the table pertaining to the Chapter 3 AMR; the X indicates the table number from Volume 1 of the GALL Report (see the definition table below), the 1 indicates that this is the first table type (Table 1) in Section 3.X, and the A indicates that it applies to Unit 1. For example, in the reactor vessel, internals, and reactor coolant systems subsection, this is Table 3.1.1.A, and in the engineered safety features systems subsection, this is Table 3.2.1.A.

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

The second table type is Table 3.X.2.A-Y where 3 again indicates the NMP LRA section number; X again indicates the table number from Volume 1 of the GALL Report; the 2 indicates that this is the second table type (Table 2) in Section 3.X; the A indicates that it applies to Unit 1; and Y indicates the system table number. For example, within the reactor vessel, internals, and reactor coolant systems subsection, the AMR results for the reactor pressure vessel are presented in Table 3.1.2.A-1. In the engineered safety features subsection, the containment spray system results are presented in Table 3.2.2.A-1.

The applicant compared the NMP Unit 1 AMR results with information set forth in the tables of the GALL Report and provided the results of its comparisons in two table types that correlate with the two table types described above.

1.3.1.1 Overview of NMP ALRA Table 1

NMP ALRA Table 1 provides a summary comparison of how the NMP AMR results align with the corresponding tables of the GALL Report. The NMP LRA Table 1 consists of the following columns: "Item Number," "Component," "Aging Effect/Mechanism," "AMPs," "Further Evaluation Recommended," and "Discussion." These NMP ALRA tables have the same format and are essentially the same as Tables 1 through 6 of the GALL Report, except that the "Type" column of the GALL Report tables was replaced by an "Item Number" column and the "Item Number in GALL" column of the GALL Report tables was replaced by a "Discussion" column. The "Discussion" column includes further clarifying/amplifying information. The following are examples of information that are contained within the "Discussion" column:

(1) information on further evaluation required or reference to the location of that information

(2) the name of a plant-specific program being used

(3) exceptions to the GALL Report assumptions

(4) a discussion of how the line item is consistent with the corresponding line item in the GALL Report

(5) a discussion of how the line item differs from the corresponding line item in the GALL Report, when it may appear to be consistent

1.3.1.2 Overview of NMP ALRA Table 2

The NMP ALRA Table 3.X.2.A-Y (Table 2) provides the detailed results of the AMRs for those components identified in NMP ALRA Section 2 as being subject to an AMR. There is a Table 2 for each of the components or systems within a system grouping (e.g., reactor vessel, internals, and reactor coolant systems, engineered safety features, auxiliary systems, etc.). For example, the engineered safety features system group contains tables specific to the containment spray system, core spray system, emergency cooling system, hydrogen recombiner system, high pressure core spray system, low pressure core spray system, reactor core isolation cooling system, residual heat removal system, and standby gas treatment system. Table 2 consists of the following nine columns:

(1) *Component Type* - The first column 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.

(2) *Intended Function* - The second column 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 NMP ALRA.

(3) *Material* - The third column lists the particular materials of construction for the component type being evaluated.

(4) *Environment* - The fourth column 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 Table 3.0-1 and Table 3.0-2, respectively.

(5) *Aging Effect Requiring Management* - The fifth column lists the aging effects/mechanisms identified as requiring management for the material and environment combinations of each component type.

(6) *Aging Management Programs* - The sixth column lists the programs used to manage the aging effects/mechanisms requiring management.

(7) *GALL Report Volume 2 Item* - The seventh column documents identified consistencies of factors listed in Table 2 of the NMP ALRA with the GALL Report by noting the appropriate GALL Report item number. Each combination of the following factors listed in Table 2 is compared to the GALL Report to identify those

consistencies: component type, material, environment, aging effect/mechanism requiring management, and AMP. If there is no corresponding item number in the GALL Report for a particular combination of factors, Column 7 is left blank.

(8) *Table 1 Item* - The eighth column is a cross reference of line items from Table 2 to Table 1. 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/mechanism requiring management, and AMP. 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.

(9) *Notes* - The ninth column contains notes that are used to describe the degree of consistency with the line items in the GALL Report. Notes that use letter designations are standard notes based on the 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). (Note that 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].) Notes that use numeric designators are specific to NMP. The letter notes are described in detail in Section 3.0 of this audit and review report.

NMP ALRA Table 2 contains the AMR results and indicates whether the results correspond to a line item in Volume 2 of the GALL Report. Correlations between the combination in NMP ALRA Table 2 and a combination for a line item in Volume 2 of the GALL Report are identified by the GALL Report item number in Column 7. If Column 7 is blank, the applicant did not identify a corresponding combination in the GALL Report. If the applicant identified a GALL Report line item, the next column provides a reference to a Table 1 row number. This reference corresponds to the GALL Report Volume 2 "roll-up" to the GALL Report Volume 1 tables. Many of the GALL Report evaluations refer to plant-specific programs. In these cases, the applicant considers the NMP evaluation to be consistent with the GALL Report if the other elements are consistent. Any AMP suitable for management of a particular aging effect/mechanism is considered to be consistent with the GALL Report program for line items referring to a plant-specific or alternative program if it has been reviewed and determined to be consistent with the program elements (attributes) used to review the plant-specific program.

1.3.2 NMP Unit 2 License Renewal Application Tables

NMP Unit 2 ALRA Tables 3.0-1 and 3.0-2 provide descriptions of the internal and external service environments, respectively, for the mechanical, electrical, and structures and component supports used in the AMRs to determine the aging effects/mechanisms requiring management. Results of the AMRs are presented in two table types.

The first table type is Table 3.X.1.B, where the 3 indicates the table pertaining to the Chapter 3 AMR; the X indicates the table number from Volume 1 of the GALL Report (see the definition table below), the 1 indicates that this is the first table type (Table 1) in Section 3.X, and the B indicates that it applies to Unit 2. For example, in the reactor vessel, internals, and reactor coolant systems subsection, this is Table 3.1.1.B, and in the engineered safety features subsection, this is Table 3.2.1.B.

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

The second table type is Table 3.X.2.B-Y where 3 again indicates the NMP ALRA section number; X again indicates the table number from Volume 1 of the GALL Report; the 2 indicates that this is the second table type (Table 2) in Section 3.X; the B indicates that it applies to Unit 2; and Y indicates the system table number. For example, within the reactor vessel, internals, and reactor coolant systems subsection, the AMR results for the reactor pressure vessel are presented in Table 3.1.2.B-1. In the engineered safety features subsection, the hydrogen recombiner system results are presented in Table 3.2.2.B-1.

The applicant compared the NMP Unit 2 AMR results with information set forth in the tables of the GALL Report and provided the results of its comparisons in two table types that correlate with the two table types described above.

1.3.2.1 Overview of NMP ALRA Table 1

NMP ALRA Table 1 provides a summary comparison of how the NMP AMR results align with the corresponding tables of the GALL Report. The NMP ALRA Table 1 consists of the following columns: “Item Number,” “Component,” “Aging Effect/Mechanism,” “AMPs,” “Further Evaluation Recommended,” and “Discussion.” These NMP LRA tables have the same format and are essentially the same as Tables 1 through 6 of the GALL Report, except that the “Type” column of the GALL Report tables was replaced by an “Item Number” column and the “Item Number in GALL” column of the GALL Report tables was replaced by a “Discussion” column. The “Discussion” column includes further clarifying/amplifying information. The following are examples of information that are contained within the “Discussion” column:

(1) information on further evaluation required or reference to the location of that information

(2) the name of a plant-specific program being used

(3) exceptions to the GALL Report assumptions

(4) a discussion of how the line item is consistent with the corresponding line item in the GALL Report

(5) a discussion of how the line item differs from the corresponding line item in the GALL Report, when it may appear to be consistent

1.3.2.2 Overview of NMP ALRA Table 2

The NMP ALRA Table 3.X.2.B-Y (Table 2) provides the detailed results of the AMRs for those components identified in NMP ALRA Section 2 as being subject to an AMR. There is a Table 2 for each of the components or systems within a system grouping (e.g., reactor vessel, internals, and reactor coolant systems, engineered safety features, auxiliary systems, etc.). For example, the engineered safety features system group contains tables specific to the hydrogen recombiner system, high pressure core spray system, low pressure core spray system, reactor core isolation cooling system, residual heat removal system, and standby gas treatment system. Table 2 consists of the following nine columns:

(1) *Component Type* - The first column 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.

(2) *Intended Function* - The second column 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 NMP ALRA.

(3) *Material* - The third column lists the particular materials of construction for the component type being evaluated.

(4) *Environment* - The fourth column 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 Table 3.0-1 and Table 3.0-2, respectively.

(5) *Aging Effect Requiring Management* - The fifth column lists the aging effects/mechanisms identified as requiring management for the material and environment combinations of each component type.

(6) *Aging Management Programs* - The sixth column lists the programs used to manage the aging effects/mechanisms requiring management.

(7) *GALL Report Volume 2 Item* - The seventh column documents identified consistencies of factors listed in Table 2 of the NMP ALRA with the GALL Report by noting the appropriate GALL Report item number. Each combination of the following factors listed in Table 2 is compared to the GALL Report to identify those consistencies: component type, material, environment, aging effect/mechanism requiring management, and AMP. If there is no corresponding item number in the GALL Report for a particular combination of factors, Column 7 is left blank.

(8) *Table 1 Item* - The eighth column is a cross reference of line items from Table 2 to Table 1. 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/mechanism requiring management, and AMP. 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.

(9) *Notes* - The ninth column contains notes that are used to describe the degree of consistency with the line items in the GALL Report. Notes that use letter designations are standard notes based on the 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). (Note that 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].) Notes that use numeric designators are specific to NMP. The letter notes are described in detail in Section 3.0 of this audit and review report.

NMP ALRA Table 2 contains the AMR results and indicates whether the results correspond to a line item in Volume 2 of the GALL Report. Correlations between the combination in NMP ALRA Table 2 and a combination for a line item in Volume 2 of the GALL Report are identified by the GALL Report item number in Column 7. If Column 7 is blank, the applicant did not identify a corresponding combination in the GALL Report. If the applicant identified a GALL Report line item, the next column provides a reference to a Table 1 row number. This reference corresponds to the GALL Report Volume 2 “roll-up” to the GALL Report Volume 1 tables. Many of the GALL Report evaluations refer to plant-specific programs. In these cases, the applicant considers the NMP evaluation to be consistent with the GALL Report if the other elements are consistent. Any AMP suitable for management of a particular aging effect/mechanism is considered to be consistent with the GALL Report program for line items referring to a plant-specific or alternative program if it has been reviewed and determined to be consistent with the program elements (attributes) used to review the plant-specific program.

1.4 Audit and Review Scope

The AMRs and associated AMPs that the project team reviewed are identified in the NMP audit and review plan. The project team examined 35 of the NMP AMPs and associated AMRs. The project team reviewed AMPs and AMRs that the applicant claimed were consistent with the GALL Report. The project team also reviewed one plant-specific AMP.

The applicant noted that some of its AMPs, although described as consistent with the GALL Report, contain some deviations from the GALL Report. These deviations are of two types:

- exceptions to the GALL Report - exceptions are specified GALL Report recommendations that the applicant does not intend implement.

- enhancements - enhancements include those actions/activities necessary to ensure consistency with GALL Report AMP recommendations or provide additional features to the program or program activities that the applicant will implement prior to the period of extended operation. Enhancements may expand, but not reduce, the scope of an AMP.

The project team reviewed all NMP ALRA Table 2s AMRs line items in Chapter 3, except those that were assigned to the Office of Nuclear Reactor Regulation (NRR), Division of Engineering (DE) staff. Those the project team reviewed were either consistent with the GALL Report, as identified by Notes A through E in NMP ALRA Tables 3.X.2.A-Y or 3.X.2.B-Y (from Column 9 of the Table 2s discussed in Section 1.3 of this audit and review report), or reviewed and accepted by the project team on the basis of an NRC-approved precedent (see Section 1.5.3 below).

1.5 Audit and Review Process

The project team performed the audit and review in accordance with the criteria defined in NUREG-1800, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants (SRP-LR).” Additional details on how the SRP-LR criteria were addressed are provided in the NMP audit and review plan. This review process is summarized in this section.

1.5.1 NMP AMPs

For the NMP AMPs for which the applicant claimed consistency with the AMPs in the GALL Report, the project team determined consistency. The project team reviewed the NMP AMP descriptions and compared the program elements for those AMPs to the corresponding program elements for the GALL Report AMPs (Attachment 3 shows the 10 program elements from the SRP-LR). As discussed in the NMP audit and review plan, the attributes associated with Appendix B of 10 CFR Part 50 were reviewed by the NRR Division of Inspection Program Management (DIPM) and the results documented in Section 3 of the safety evaluation report (SER) related to the NMP ALRA.

For NMP AMPs that have one or more exception and/or enhancement, the project team reviewed each exception and/or enhancement to determine whether the exception and/or enhancement is acceptable and whether the NMP AMP, as modified by the exception and/or enhancement, would adequately manage the aging effects/mechanisms for which it is credited. In some cases, the project team identified differences that the applicant did not identify between the NMP AMPs credited by the applicant and the GALL Report AMPs. In these cases, the project team reviewed the difference to determine whether or not it is acceptable and whether or not the AMP, as modified by the difference, would adequately manage the aging effects/mechanisms.

1.5.2 NMP AMR Results

The AMRs in the GALL Report fall into two broad categories:

- those that the GALL Report concludes are adequate to manage aging of the components referenced in the GALL Report.

- those for which the GALL Report concludes that further evaluation is recommended for certain aspects of the aging management process.

The project team determined that the AMR results reported by the applicant to be consistent with the GALL Report are consistent with the GALL Report. The project also determined that the plant-specific AMR results reported by the applicant to be justified on the basis of an NRC-approved precedent are technically acceptable and applicable. For AMR results for which the GALL Report recommends further evaluation, the project team reviewed the applicant's evaluation to determine whether it adequately addresses the issues for which the GALL Report recommended further evaluation.

1.5.3 NRC-Approved Precedents

To help facilitate the project team's review of its LRA, an applicant may reference NRC-approved precedents to demonstrate that its non-GALL Report programs correspond to reviews that the NRC had approved for other plants during its review of previous applications for license renewal. When an applicant elected to provide precedent information, the project team determined whether the material presented in the precedent was applicable to the applicant's facility, determined whether the plant program was bound by the conditions for which the precedent was evaluated and approved, and determined that the plant program contained the program elements of the referenced precedent. In general, if the project team determined that these conditions were satisfied, it used 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 determined that a precedent identified by the applicant was not applicable to the particular plant program for which it is credited, it may have referred the program to the NRR DE for review in the traditional manner, i.e., as described in the SRP-LR, without consideration of the precedent information. As noted in Section 1.4 of this report, the applicant chose to provide precedent information to support its selection of certain NMP programs. Therefore, some of the project team reviews documented in this audit and review report considered precedent information in the manner described above.

1.5.4 UFSAR and USAR Supplements

Consistent with the SRP-LR, for the AMR results and associated AMPs that it reviewed, the project team also reviewed the Updated Final Safety Analysis Report (UFSAR) and the Updated Safety Analysis Report (USAR) supplements that summarize the applicant's programs and activities for managing the effects of aging for the period of extended operation, as required by 10 CFR 54.21(d).

1.5.5 Documentation and Documents Reviewed

In performing its work, the project team relied heavily on the NMP ALRA, the SRP-LR, and the GALL Report. The project team also examined the applicant's AMP program attribute assessment documents (a catalog of the documentation used by the applicant to develop or justify its AMPs), and other applicant documents, including selected implementing procedures, to verify that the applicant's activities and programs will adequately manage the effects of aging on SCs.

Any discrepancies or issues discovered during the audit and review that required a formal response on the docket are documented in this audit and review report. If an issue was not docketed or was not resolved prior to issuing this audit and review report, a request for additional information (RAI) was prepared by the project team describing the issue and the information needed to disposition the issue. The RAI, if needed, is included and dispositioned in the NMP SER related to the ALRA. The list of RAIs associated with the audit and review is provided in Attachment 4 to this audit and review report.

Attachment 5 characterizes the nature and extent of the project team's reviews of the applicant's documents and lists the documents reviewed by the project team. During its on-site visits, the project team also conducted detailed discussions and interviews with the applicant's license renewal project personnel and other personnel with technical expertise relevant to aging management.

1.5.6 Commitments to be Included in the Safety Evaluation Report

During the audit, the project team requested additional information to resolve issues related to the content of the ALRA. In responding to these requests for additional information, the applicant, in some cases, committed to supplement its ALRA to correct entries or implement additional activities, as needed, to appropriately manage aging of the various systems, components and structures within the scope of license renewal. A list of these commitments is included in Attachment 6 of this audit and review report.

1.6 Exit Meeting

The project team held a public exit meeting with the applicant on November 18, 2005 to discuss the results of its audits and reviews of the AMPs and AMRs results assigned to the project team. These discussions reflected the project team's work and its results, as documented in this audit and review report.

2.0 Aging Management Programs Audit and Review Results

The project team's audit and review activities for the NMP AMPs and its conclusions regarding these programs are documented below. The audit and review was performed in accordance with the guidance contained in the NMP audit and review plan as summarized in Section 1.5 of this audit and review report.

2.1 ASME SECTION XI INSERVICE INSPECTION (SUBSECTIONS IWB, IWC, IWD) PROGRAM (NMP AMP B2.1.1)

In NMP ALRA, Appendix B, Section B2.1.1, the applicant states that NMP AMP B2.1.1, "ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program," is an existing plant program that is consistent with GALL AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," with exceptions.

2.1.1 Program Description

The applicant states, in the NMP ALRA, that this program manages aging of Class 1, 2, and 3 pressure-retaining components and their integral attachments. The applicant also states that program activities include periodic visual, surface, and/or volumetric examination and pressure tests of Class 1, 2, and 3 pressure retaining components. This program is based on the American Society of Mechanical Engineers (ASME) Section XI, 1989 Edition, with no Addenda and ASME Section XI, Appendix VIII, 1995 Edition through 1996 Addenda. Examination categories B-F, B-J, C-F-1, C-F-2 and IGSCC Category A are inspected using NRC approved Risk-Informed Methodology. Through the audit and review, the applicant also states that "Prior to the period of extended operation, the ISI Program will be updated to the latest Edition and Addenda of ASME Section XI as mandated by 10 CFR 50.55a and 10 CFR 54 requirements."

2.1.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.1 is consistent with GALL AMP XI.M1, with exceptions.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.1, including program basis document, LR-PBD-IWBCD, "ASME Section XI Inservice Inspection, Subsections IWB IWC, and IWD (Units 1 and 2)," which provides an assessment of the AMP element's consistency with GALL AMP XI.M1.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.1 and associated basis documents against GALL AMP XI.M1 for consistency.

The project team reviewed those portions of the ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program for which the applicant claims consistency with GALL AMP XI.M1 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program provides reasonable assurance that aging effects/mechanisms will be managed for Class 1, 2, and 3 pressure-retaining components and their integral attachments. The project team finds the applicant's ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program acceptable because it conforms to the recommended GALL AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," with the exceptions as described below.

2.1.3 Exceptions to the GALL Report

The applicant states, in the NMP ALRA, that the exceptions to the GALL Report program elements are as follows:

Elements:	4: Detection of Aging Effects 5: Monitoring and Trending
Exceptions:	The program is based on the 1989 Edition of ASME Section XI with no addenda. Examination categories B-F, B-J, C-F-1, C-F-2 and IGSCC Category A are inspected per the requirements of the EPRI risk-informed methodology and ASME Code Case N–578-1.

The GALL Report identifies the following recommendations for the program elements associated with the exceptions taken:

> Detection of Aging Effects: ASME Section XI requirements covered in the 1995 Edition through the 1996 addenda are cited.
>
> Monitoring and Trending: Components shall be examined and tested as specified in Table IWB-2500-1 and Table IWC-2500-1 of ASME Code Section XI.

The applicant states, in the NMP ALRA, that its ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program is based on the 1989 Edition with no addenda and was found acceptable by the NRC in Safety Evaluation Reports (SERs) dated October 5, 2000 and March 3, 2000, respectively. Additionally, the ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Programs for NMP Unit 1 and NMP Unit 2 implement the EPRI risk-informed methodology and ASME Code Case N-578-1 as approved by an NRC plant-specific relief request.

The GALL Report identifies that the 1989 Code Edition covers all examination categories identified in the 1995 Edition through the 1996 Addenda and the 1995 Edition of ASME Code eliminates the hydrostatic test because equivalent results are obtained from the leakage test. The project team also compared the acceptance criteria differences between the 1989 Edition and the 1995 Edition through the 1996 Addenda of ASME Section XI. The project team finds that the acceptance criteria identified in the 1989 Edition is more conservative than the acceptance criteria identified in the 1995 Edition through the 1996 Addenda. Subsection IWB-3640 in the 1989 Edition sets the acceptable flaw depth upper limit as 60% of the wall thickness, whereas IWB-3640 in the 1995 Edition through the 1996 Addenda sets the acceptable flaw depth upper limit as 75% of the wall thickness for the shielded metal-arc welds and submerged arc welds. Additionally, the project team reviewed the SERs for the NMP ISI plans, which are based on the 1989 Edition of ASME Section XI. On this basis, the project team finds the Code Edition exception acceptable.

The project team noted that the applicant's risk-informed inservice inspection (RI-ISI) relief request is valid for a 10-year inspection interval under the current licensing basis and requested that the applicant provide additional justification for extending this risk-informed relief request for the period of extended operation. In a letter dated December 1, 2005 (ML0534604458), the applicant states that the program description is revised by deleting "using the EPRI risk-informed methodology and implemented in accordance with ASME Code Case N-578-1 as approved by the NRC plant-specific Relief Request" and replacing it with "using NRC approved Risk-Informed Methodology. Prior to the period of extended operation, the ISI Program will be updated to the latest Edition and Addenda of ASME Section XI as mandated by 10 CFR 50.55a and 10 CFR 54 requirements." At present, a RI-ISI program is approved for use on an ASME Code 10-year ISI interval specific basis. However, the applicant will have to request approval to use the RI-ISI program for the specific intervals during the period of extended operation in accordance with 10 CFR 50.55a, 12 months prior to each interval. Therefore, the project team finds that the ASME Section XI Code Edition in effect, as referenced in 10 CFR 50.55a, 12 months prior to each inspection interval of extended operation, as modified by an NRC-approved RI-ISI Methodology program, is acceptable for the period of extended operation. The project team concludes that the applicant's response is acceptable.

The project team determined that while the number of the examinations is reduced, the risk from implementation of RI-ISI is expected to slightly decrease when compared to that estimated from the current requirements. The primary basis for the risk reduction is that examinations will be required for safety significant piping segments, which may not be currently inspected per the existing ASME Section XI Program. In addition, the RI-ISI Program is a living program that requires updating and expansion based on industry and site specific inspection findings. On this basis, the project team finds this exception acceptable.

2.1.4 Enhancements

None

2.1.5 Operating Experience

The applicant states, in the NMP ALRA, that it has reviewed both industry and plant-specific operating experience relating to its ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program. Review of plant-specific operating experience revealed deviation event reports (DERs) documenting indications of flaws in recirculation components, piping, and various nozzle connection welds. Deficiencies identified by the applicant's ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program activities have been repaired, replaced, or evaluated as acceptable in accordance with ASME Section XI and station implementing procedures. The plant continuously reviews industry operating experience to determine its applicability to NMP and adjusts inspection plans accordingly. Plant-specific operating experience is reviewed and trended; findings are documented, reviewed, and resolved; corrective actions are taken; and mitigative actions to limit aging initiated.

The project team reviewed the applicant's supporting documents which evaluate and document the industry experiences, as identified in GE Service information letters (SILs), against its ISI Program. The project team finds that the applicant continuously addresses industry operating experience (OE) and adjusts its inspection plans accordingly.

The project team also reviewed the applicant's corrective action program, which revealed that DERs were initiated when ISI inspections found stress corrosion cracking (SCC) in the reactor coolant system. The project team found the review indicated that the applicant's ISI Program is effective in identifying degradation and implementing repairs. The following is a sample list of typical DERs for SCC:

- DER-NM-1999-1908, DER-U1-2001-1659, and DER-U1-1999-1042 - Two control rod drive penetrations were found to be leaking. UT discovered that leaks developed due to tube through wall cracking.

- DER-NM-1995-470 - Core Spray Sparger Nozzle; a three-inch indication was found in Loop-A of Nozzle 23. IGSCC is considered to be the cause of initiation of this indication.

- DER-U1-1993-1875, DER-U1-1993-2209, DER-U1-1994-2395, DER-U1-1995-107, DER-U1-200-991, DER-U1-2003-3147 - These DERs were initiated in reference to industry operating experience on other BWRs. They are listed to indicate that industry OE is reviewed and considered for impact on NMP Unit 1.

- DER-NM-1998-1584 - separation of the collar attached to the dry tubes installed in locations 32-37 and 16-21 associated with IRM D and SRM D, respectively. The condition is believed to be the result of SCC at the creviced joint of the collar and plunger.

- DER-U2-2002-1228 - Broken tie bar for the shroud head and steam separator assembly found during ISI visual inspection.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's ASME Section XI Inservice Inspection (Subsection IWB, IWC, IWD) Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.1.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program in NMP ALRA, Appendix A, Section A1.1.4 for NMP Unit 1 and Section A2.1.5 for NMP Unit 2, respectively, which state that the program manages aging of Class 1, 2, or 3 pressure-retaining components and their integral attachments. Program activities include periodic visual, surface, and/or volumetric examinations and pressure tests of Class 1, 2, and 3 pressure-retaining components. The applicant also states that its ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program is based on the ASME Section XI 1989 Edition with no Addenda and ASME Section XI, Appendix VIII, 1995 Edition through 1996 Addenda. Examination categories B-F, B-J, C-F-1, C-F-2 and IGSCC Category A are inspected using EPRI risk-informed methodology and implemented in accordance with ASME Code Case N-578-1 as approved by an NRC plant-specific relief request. These are exceptions to the program described in the GALL Report (which cites ASME Section XI requirements covered in the 1995 Edition through the 1996 Addenda).

During its audit and review, the project team noted that the applicant's RI-ISI relief request is valid for a 10-year inspection interval under the current licensing basis and requested that the applicant provide additional justification for the determination of extending this risk-informed relief request for the period of extended operation. The applicant states that it would revise Appendix A to remove that basis of relief request. In a letter dated December 1, 2005, the applicant states that NMP ALRA, Appendix A, Section A1.1.4 and Section A2.1.5 have been revised by deleting "using the EPRI risk-informed methodology and implemented in accordance with ASME Code Case N-578-1 as approved by the NRC plant-specific Relief Request" and replacing it with "using NRC approved Risk-Informed Methodology. Prior to the period of extended operation, the ISI Program will be updated to the latest Edition and Addenda of ASME Section XI as mandated by 10 CFR 50.55a and 10 CFR 54 requirements." The project team reviewed the applicant's response and concludes that it is acceptable.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.1, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.1.7 Conclusion

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, the project team has reviewed the exceptions and the associated justifications and determined that the AMP, with the exceptions is adequate to manage the aging effects/mechanisms for which it is credited. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.2 WATER CHEMISTRY CONTROL PROGRAM (NMP AMP B2.1.2)

In NMP ALRA, Appendix B, Section B2.1.2, the applicant states that NMP AMP B2.1.2, "Water Chemistry Control Program" is an existing plant program that is consistent with GALL AMP XI.M2, "Water Chemistry," with exceptions.

2.2.1 Program Description

The applicant states, in the NMP ALRA, that this program is an existing program that manages aging effects/mechanisms by controlling the internal environment of the reactor water, feedwater, condensate, and control rod drive (CRD) systems, and related auxiliaries (such as the NMP Unit 1 torus, NMP Unit 2 suppression pool, condensate storage tank, and spent fuel pool). The aging effects/mechanisms of concern are (1) loss of material and (2) crack initiation and growth. Program activities include monitoring and controlling concentrations of known detrimental chemical species below the levels known to cause degradation. The applicant's Water Chemistry Control Program implements the guidelines for BWR water chemistry presented in EPRI Reports TR-103515-R1, "BWR Water Chemistry Guidelines-1993 Revision, Normal and Hydrogen Water Chemistry" and TR-103515-R2.

In addition, the applicant states, in the NMP ALRA, that its Water Chemistry Control Program credits activities performed under the direction of NMP AMP B2.1.1, "ASME Section XI Inservice Inspection (IWB, IWC, IWD) Program," and NMP AMP B2.1.20, "One-Time Inspection Program" to verify program effectiveness, including areas of low flow or stagnant water.

2.2.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.2 is consistent with GALL AMP XI.M2, with exceptions.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.2, including program basis document, LR-PBD-WCHEM, "Water Chemistry (Units 1 and 2)," which provides an assessment of the AMP elements' consistency with GALL AMP XI.M2.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.2 and associated basis document against GALL AMP XI.M2 for consistency.

The project team reviewed those portions of the Water Chemistry Control Program for which the applicant claims consistency with GALL AMP XI.M2 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's Water Chemistry Control Program provides reasonable assurance that it will mitigate aging effects/mechanisms such as loss of material and crack initiation and growth. The project team finds the applicant's Water Chemistry Control Program acceptable because it conforms to the recommended GALL AMP XI.M2, "Water Chemistry," with the exceptions as described below.

2.2.3 <u>Exceptions to the GALL Report</u>

The applicant states, in the NMP ALRA, that the exception to the GALL Report program element is as follows:

> Element: 1: Scope of Program
> Exception: The program described in GALL AMP XI.M2, identifies the EPRI TR-103515-R0 report as the basis for BWR water chemistry programs. EPRI periodically updates the water chemistry guidelines as new industry experience becomes available. Revisions 1 and 2 of the EPRI report incorporate the industry experience and are the basis for the NMP Unit 1 Water Chemistry Control Program whereas NMP Unit 2 uses only Revision 2 of TR-103515. The specific exceptions are identified under the applicable program elements below.

The GALL Report identifies the following recommendation for the "scope of program" program element associated with the exception taken:

> The program includes periodic monitoring and control of known detrimental contaminants such as chlorides, dissolved oxygen, and sulfate concentrations below the levels known to result in loss of material or crack initiation and growth. Water chemistry control is in accordance with the guidelines in BWRVIP-29 (EPRI TR-103515) for water chemistry in BWRs or later revisions or updates of these reports as approved by the staff.

The specific impacts of this scope of program exception are addressed in the program elements which are affected by the use of later revisions of the EPRI TR-103515 so no evaluation is provided for the "scope of program" element.

The applicant also states, in the NMP ALRA, that the exception to the GALL Report program element is as follows:

> Element: 3: Parameters Monitored/Inspected
> Exception: The program described in GALL AMP XI.M2, identifies the EPRI TR-103515-R0 report as the basis for BWR water chemistry programs.

EPRI TR-103515-R0 recommends electrochemical potential (ECP) to be monitored during power operations and does not distinguish between normal water chemistry (NWC) and hydrogen water chemistry (HWC). NMP Unit 1 takes an exception to this in that ECP is only monitored under HWC operation. NMP Unit 2 also takes an exception to monitoring ECP in accordance with Revision 0 of the EPRI report. NMP Unit 2 does not monitor ECP directly but monitors the molar ratio of hydrogen-to-oxygen as an acceptable alternative.

The GALL Report text also recommends that hydrogen peroxide be monitored to manage stress corrosion cracking and corrosion in BWR plants. Both NMP Unit 1 and NMP Unit 2 take exception to this since the accurate measurement of hydrogen peroxide is extremely difficult due to the rapid decomposition of this chemical in the sample lines. As an alternative, in conjunction with Revision 2 of the EPRI document, NMP Unit 1 measures ECP and NMP Unit 2 measures the molar ratio of hydrogen to oxygen.

The GALL Report identifies the following recommendation for the "parameters monitored/inspected" program element associated with the exception taken:

> The concentration of corrosive impurities listed in the EPRI guidelines discussed above, which include chlorides, sulfates, dissolved oxygen, and hydrogen peroxide, are monitored to mitigate degradation of structural materials. Water quality (pH and conductivity) is also maintained in accordance with the guidance. Chemical species and water quality are monitored by in process methods or through sampling. The chemistry integrity of the samples is maintained and verified to ensure that the method of sampling and storage will not cause a change in the concentration of the chemical species in the samples.
>
> BWR Water Chemistry: The guidelines in BWRVIP-29 (EPRI TR-103515) for BWR reactor water recommend that the concentration of chlorides, sulfates, and dissolved oxygen are monitored and kept below the recommended levels to mitigate corrosion. The two impurities, chlorides and sulfates, determine the coolant conductivity; dissolved oxygen, hydrogen peroxide, and hydrogen determine ECP. The EPRI guidelines recommend that the coolant conductivity and ECP are also monitored and kept below the recommended levels to mitigate SCC and corrosion in BWR plants. The EPRI guidelines in BWRVIP-29 (TR-103515) for BWR feedwater, condensate, and control rod drive water recommends that conductivity, dissolved oxygen level, and concentrations of iron and copper (feedwater only) are monitored and kept below the recommended levels to mitigate SCC. The EPRI guidelines in BWRVIP-29 (TR-103515) also include recommendations for controlling water chemistry in auxiliary systems: torus/pressure suppression chamber, condensate storage tank, and spent fuel pool.

In regard to the NMP Unit 1 exception to monitoring ECP only when under HWC, the latest industry experience provided in Revision 2 to EPRI TR-10315 requires ECP to be monitored only if plants are implementing HWC or HWC with noble metal chemical addition. Based on the latest industry information, the project team finds this acceptable. In regard to NMP Unit 2, the applicant states in the NMP ALRA that NMP Unit 2 does not directly monitor ECP, but rather monitors the molar ratio of hydrogen to oxygen as an acceptable alternative based on the latest industry guidance provided in Revision 2 of EPRI TR-10315. Based on the use of an alternative measurement that would provide the same level of effectiveness, the project team finds this acceptable.

Based on a review of the information provided in the NMP ALRA, the project team finds that the applicant has proposed acceptable alternative methods for both NMP Unit 1 and NMP Unit 2 to measure the level of hydrogen peroxide in the coolant. As described in the exception above, NMP Unit 1 measures electrochemical potential. The molar ratio of hydrogen-to-oxygen is used for NMP Unit 2 to monitor the presence of excessive hydrogen peroxide. On this basis, the project team finds this exception acceptable.

In addition, the applicant states, in the NMP ALRA, that the exception to the GALL Report program element is as follows:

Element: 5: Monitoring and Trending

Exception: The program described in GALL AMP XI.M2, identifies the EPRI TR-103515-R0 report as the basis for BWR water chemistry programs.

EPRI TR-103515-R0 recommends that chlorides and sulfates in reactor water be sampled daily. NMP Unit 2 takes exception to this in that sampling for these chemical species occurs only three times per week.

EPRI TR-103515-R0 recommends that ECP be monitored continuously for reactor water. NMP Unit 2 takes exception to this in that ECP is not monitored.

EPRI TR-103515-R0 recommends that the sampling frequencies and action levels for feedwater iron and copper commence at >10% power. Both NMP Unit 1 and NMP Unit 2 take exception to this guideline as these sampling activities do not commence until 25% power.

The GALL Report identifies the following recommendation for the “monitoring and trending” program element associated with the exception taken:

> The frequency of sampling water chemistry varies (e.g., continuous, daily, weekly, or as needed) based on plant operating conditions and the EPRI water chemistry guidelines. Whenever corrective actions are taken to address an abnormal chemistry condition, increased sampling is utilized to verify the effectiveness of these actions.

In regard to the NMP Unit 2 exception to daily monitoring of chlorides and sulfates, the applicant states, in the NMP ALRA, that these species are part of the conductivity measurement and, since conductivity is monitored continuously, any increase in conductivity above Action Level 1 requires daily sampling to determine the concentration of monitored species. The applicant further states that this sampling plan is consistent with the guidance provided in Revisions 0 and 2 of the EPRI report. Because the resulting program does not reduce the effectiveness of the NMP Unit 2 Water Chemistry Control Program, the project team finds this acceptable.

In regard to not continuously monitoring ECP for NMP Unit 2, the applicant states, in the NMP ALRA, that the molar ratio of hydrogen-to-oxygen is used as an acceptable alternative. Furthermore, the applicant states that BWRVIP-62 provides the technical correlation between these two parameters and establishes an operating goal for the value of hydrogen-to-oxygen molar ratio. Because the resulting program does not reduce the effectiveness of the NMP Unit 2 Water Chemistry Control Program, the project team finds this acceptable.

In regard to initiating sampling frequencies and action levels at >10% power, the applicant states, in the NMP ALRA, that, for both NMP Unit 1 and NMP Unit 2, the justification for this exception is that the filter samples collected below 25% power are not representative and the operating time between 10% and 25% power is short enough to be considered insignificant. Because of the limited time between 10 and 25% power, the project team concludes that this does not reduce the effectiveness of the NMP Water Chemistry Control Program. On this basis, the project team finds this acceptable.

Furthermore, the applicant states, in the NMP ALRA, that the exception to the GALL Report program element is as follows:

Element: 6: Acceptance Criteria

Exception: The program described in GALL AMP XI.M2, identifies the EPRI TR-103515-R0 report as the basis for BWR water chemistry programs. EPRI periodically updates the water chemistry guidelines as new industry experience becomes available. Revisions 1 and 2 of the EPRI report incorporate the industry experience and are the basis for the NMP Unit 1 Water Chemistry Control Program whereas NMP Unit 2 uses only Revision 2 of TR-103515.

EPRI TR-103515-R0 recommends that an action level be established for ECP during power operations. NMP Unit 1 takes exception to the establishment of an action level but does establish an administrative goal that is the same value as the action level.

EPRI TR-103515-R0 recommends specific values for Action Levels 2 and 3 for reactor water chlorides and sulfates under HWC/NMCA conditions during power operations. NMP Unit 2 takes exception to these values by using the corresponding values recommended in Revision 2 of the EPRI report.

The GALL Report identifies the following recommendation for the “acceptance criteria” program element associated with the exception taken:

> Maximum levels for various contaminants are maintained below the system specific limits as indicated by the limits specified in the corresponding EPRI water chemistry guidelines. Any evidence of the presence of aging effects/mechanisms or unacceptable water chemistry results is evaluated, the root cause identified, and the condition corrected.

In regard to establishing an action level for ECP for NMP Unit 1, the applicant states, in the NMP ALRA, that an administrative goal is established for ECP and the actions required by the NMP administrative procedure are consistent with the EPRI recommended actions for exceeding the value. The applicant further states that there is, therefore, no impact on effectiveness of the program. On the basis that NMP Unit 1 has established an administrative procedure that does not reduce the effectiveness of the applicant’s Water Chemistry Control Program, the project team finds this acceptable.

In regard to establishing the Action Levels 2 and 3 for reactor water chlorides and sulfates, the applicant states, in the NMP ALRA, that the latest industry experience indicates that these higher values do not reduce the effectiveness of the applicant’s Water Chemistry Control Program while operating at power using HWC. On the basis of maintaining the program effectiveness, the project team finds this to be acceptable.

2.2.4 Enhancements

None

2.2.5 Operating Experience

The applicant states, in the NMP ALRA, that it has reviewed both industry and plant-specific operating experience relating to its Water Chemistry Control Program. As chemistry control guidelines were evolving in the industry, NMP’s experience with reactor water system chemistry was similar to that of the industry. Review of plant-specific operating experience revealed DERs documenting instances where monitored parameters exceeded specified action levels or goals. In those instances where a chemistry action level was exceeded, prompt corrective actions were taken to re-establish proper chemistry.

The applicant also states, in the NMP ALRA, that its Water Chemistry Control Program is continually adjusted to account for industry experience and research. As additional operating experience is obtained, lessons learned will be used to adjust this program as needed.

The project team reviewed the summary of specific operating experience provided in the program basis document for the applicant’s Water Chemistry Control Program. The project team finds that there have been a significant number of DERs written as a result of monitoring the water chemistry control limits. This demonstrates the effectiveness of the program to minimize the propagation of aging effects/mechanisms of concern for SSCs within which water chemistry is controlled.

The project team also reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's Water Chemistry Control Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.2.6 UFSAR and USAR Supplements

The applicant provides its UFSAR Supplement for the Water Chemistry Control Program in NMP ALRA, Appendix A, Section A1.1.37 for NMP Unit 1, which states that the applicant's Water Chemistry Control Program manages aging effects/mechanisms by controlling the internal environment of the reactor water, feedwater, condensate, and control rod drive systems, and related auxiliaries (such as the torus, condensate storage tank, and spent fuel pool). The aging effects/mechanisms of concern are (1) loss of material and (2) crack initiation and growth. Program activities include monitoring and controlling concentrations of known detrimental chemical species below the levels known to cause degradation. The applicant's Water Chemistry Control Program implements the guidelines for BWR water chemistry presented in EPRI Reports TR-103515-R1 and TR-103515-R2. This is an exception to the program described in the GALL Report (which identifies EPRI TR-103515-R0 as the basis for BWR water chemistry programs).

The applicant also provides its USAR Supplement for the Water Chemistry Control Program in NMP ALRA, Appendix A, Section A2.1.36 for NMP Unit 2, which states that the Water Chemistry Control Program manages aging effects/mechanisms by controlling the internal environment of the reactor water, feedwater, condensate, and control rod drive systems, and related auxiliaries (such as the suppression pool, condensate storage tank, and spent fuel pool). The aging effects/mechanisms of concern are (1) loss of material and (2) crack initiation and growth. Program activities include monitoring and controlling concentrations of known detrimental chemical species below the levels known to cause degradation. The Water Chemistry Control Program implements the guidelines for BWR water chemistry presented in EPRI Report TR-103515-R2. This is an exception to the program described in the GALL Report (which identifies EPRI TR-103515-R0 as the basis for BWR water chemistry programs).

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.2, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.2.7 Conclusion

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the project team has reviewed the exceptions and the associated justifications and determined that the AMP, with the exceptions is adequate to manage the aging effects/mechanisms for which it is credited. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.3 REACTOR HEAD CLOSURE STUDS PROGRAM (NMP AMP B2.1.3)

In NMP ALRA, Appendix B, Section B2.1.3, the applicant states that NMP AMP B2.1.3, "Reactor Head Closure Studs Program," an existing plant program that is consistent with GALL AMP XI.M3, "Reactor Head Closure Studs," with an exception.

2.3.1 Program Description

The applicant states, in the NMP ALRA, that this program is an existing program that manages cracking of and loss of material from the reactor pressure vessel closure studs. The Reactor Head Closure Studs Program implements the preventive measures of Regulatory Guide 1.65. Inservice examinations are performed in accordance with the 1989 Edition of the ASME Boiler and Pressure Vessel Code with no Addenda, and ASME Section XI, Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems," 1995 Edition through 1996 Addenda as approved by the NRC in plant-specific exemptions (refer to NMP AMP B2.1.1, "ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD)."

2.3.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.3 is consistent with GALL AMP XI.M3, with an exception.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.3, including program basis document, LR-PBD-HDSTUDS, "Reactor Head Closure Studs Program," which provides an assessment of the AMP elements' consistency with GALL AMP XI.M3.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.3 and associated basis documents against GALL AMP XI.M3 for consistency.

The project team reviewed those portions of the Reactor Head Closure Studs Program for which the applicant claims consistency with GALL AMP XI.M3 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's Reactor Head Closure Studs Program provides reasonable assurance that aging management of cracking and loss of material from reactor pressure vessel closure studs within the scope of license renewal will be performed. The project team finds the applicant's Reactor Head Closure Studs Program acceptable because it conforms to the recommended GALL AMP XI.M3, "Reactor Head Closure Studs," with the exception as described below.

2.3.3 Exceptions to the GALL Report

The applicant states, in the NMP ALRA, that the exception to the GALL Report program description is as follows:

> Exception: The program described in GALL AMP XI.M3, cites ASME Section XI requirements covered in the 1995 Edition through the 1996 Addenda. The IWB/C/D ISI Programs for NMP Unit 1 and NMP Unit 2 are based on the 1989 Edition with no addenda.

The GALL Report identifies the following recommendation for the "program description" associated with the exception taken:

> This program includes (a) inservice inspection (ISI) in conformance with the requirements of the ASME Code, Section XI, Subsection IWB (1995 Edition through the 1996 Addenda), Table IWB 2500-1, and (b) preventive measures to mitigate cracking.

The applicant states, in the NMP ALRA, that there was one exception to the GALL Report. The program described in GALL AMP XI.M3, cites ASME Section XI requirements covered in the 1995 Edition through the 1996 Addenda. NMP AMP B2.1.1, "ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program" is based on the 1989 Edition with no addenda. The project team noted that the code of record is updated and approved by the NRC staff for each inspection interval in accordance with 10 CFR 50.55a, and that this regulation mandates the application of ASME Section XI, Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems," (1995 Edition with the 1996 Addenda). On this basis, the project team finds this exception acceptable.

2.3.4 Enhancements

None

2.3.5 Operating Experience

The applicant states, in the NMP ALRA, that it has reviewed both industry and plant-specific operating experience relating to its Reactor Head Closure Studs Program. NMP reactor vessel studs have experienced very little degradation. A review of plant-specific operating experience revealed only a few DERs initiated as a result of inspections of the studs, associated nuts, and washers; these related to normal maintenance issues and did not identify age-related defects. There are no existing defects in the head studs or nuts.

The project team determined that the applicant's inspection program is adequately implemented to detect indications of aging in a timely manner to allow for repair or replacement prior to bolting failure.

The project team also determined that implementation of this program provides the applicant with reasonable assurance that the effects of cracking due to SCC or IGSCC and loss of material due to wear will be adequately managed so that the intended functions of the reactor head closure studs and nuts will be maintained consistent with the CLB for the period of extended operation.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's Reactor Head Closure Studs Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.3.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the Reactor Head Closure Studs Program in NMP ALRA, Appendix A, Section A1.1.31 for NMP Unit 1 and Section A2.1.31 for NMP Unit 2, respectively, which state that this program manages cracking of and loss of material from the reactor pressure vessel closure studs. The applicant's Reactor Head Closure Studs Program implements the preventive measures of Regulatory Guide 1.65. Inservice examinations are performed in accordance with the 1989 Edition of the ASME Boiler and Pressure Vessel Code with no Addenda, and ASME Section XI, Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems," 1995 Edition through 1996 Addenda as approved by the NRC in plant-specific exemptions. This is an exception to the program described in the GALL Report (which cites ASME Section XI requirements covered in the 1995 Edition through 1996 Addenda).

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.3, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.3.7 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, the project team has reviewed the exception and the associated justifications and determined that the AMP, with the exception is adequate to manage the aging effects/mechanisms for which it is credited. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.4 THE BWR VESSEL ID ATTACHMENT WELDS PROGRAM (NMP AMP B2.1.4)

In NMP ALRA, Appendix B, Section B2.1.4, the applicant states that NMP AMP B2.1.4, "BWR Vessel ID Attachment Welds Program," is an existing plant program that is consistent with GALL AMP XI.M4, "BWR Vessel ID Attachment Welds."

2.4.1 Program Description

The applicant states, in the NMP ALRA, that this program manages the effects of cracking in reactor pressure vessel inside diameter attachment welds. The applicant's BWR Vessel ID Attachment Welds Program is based on industry guidelines issued by the BWR Vessel Internals Project (BWRVIP) and approved by the NRC. Implementation of the applicant's BWR Vessel ID Attachment Welds Program is discussed in the program description for NMP AMP B2.1.8, "BWR Vessel Internals Program."

In addition, the applicant states, in the NMP ALRA, that the attributes of its BWR Vessel ID Attachment Welds Program related to maintaining reactor coolant water chemistry are discussed in the program description for NMP AMP B2.1.2, "Water Chemistry Control Program."

2.4.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.4 is consistent with GALL AMP XI.M4.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.4, including program basis document, LR-PBD-VIDWELDS, "BWR Vessel ID Attachment Welds Program (Units 1 and 2)," which provides an assessment of the AMP elements' consistency with GALL AMP XI.M4. The project team also reviewed NER-1M-078, "Vessel ID Attachment Weld Inspection and Evaluation," Revision 1 and NER-2M-084, Revision 0.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.4 and associated basis documents against GALL AMP XI.M4 for consistency.

During its audit and review, the project team noted that NMP credits Revision 1 and Revision 2 of the EPRI TR-103515 guidelines for its reactor coolant water chemistry instead of the GALL Report recommended guidelines in BWRVIP-29. The applicant states that the "preventive actions" program element is addressed in its Water Chemistry Control Program. The project team reviewed the applicant's Water Chemistry Control Program and its evaluation is documented in Section 2.2 of this audit and review report. On the basis of its review, the project team finds this acceptable.

The project team reviewed those portions of the BWR Vessel ID Attachment Welds Program for which the applicant claims consistency with GALL AMP XI.M4 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's BWR Vessel ID Attachment Welds Program provides reasonable assurance that aging effects/mechanisms for vessel internals will be managed so that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis through the period of extended operation. The project team finds the applicant's BWR Vessel ID Attachment Welds Program acceptable because it conforms to the recommended GALL AMP XI.M4, "BWR Vessel ID Attachment Welds Program."

2.4.3 Exceptions to the GALL Report

None

2.4.4 Enhancements

None

2.4.5 Operating Experience

The applicant states, in the program basis document, that no industry operating experience with vessel ID attachment weld flaws has emerged since the release of BWRVIP-48, therefore, there is no applicable OE. The applicant also states that program changes and updates have resulted from the ongoing review of industry operating experience and regulatory notices, as these are regularly reviewed for applicability to the reactor vessel internals. NMP closely monitors the activity in the BWRVIP and ASME Section XI Code Committees. In these ways, the plant addresses vessel internal degradation noted at other BWRs in a systematic manner, and revises the BWRVIP inspections accordingly. Operating experience issues affecting NMP Unit 1 include core shroud cracking, shroud support weld cracking, CRD stub tube IGSCC cracking and leakage, and top guide cracking. Operating experience issues identified at NMP Unit 2 include core shroud cracking and jet pump wedge wear. No other significant cracking has been identified for vessel internals at either unit.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's BWR Vessel ID Attachment Welds Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.4.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the BWR Vessel ID Attachment Welds Program in NMP ALRA, Appendix A, Section A1.1.11 for NMP Unit 1 and Section A2.1.12 for NMP Unit 2, respectively, which state that its BWR Vessel ID Attachment Welds Program manages the effects of cracking in reactor pressure vessel inside diameter attachment welds. This program is based on industry guidelines issued by the BWRVIP and approved by the NRC. The applicant's BWR Vessel ID Attachment Welds Program is implemented by the BWR Vessel Internals Program for managing specific aging effects/mechanisms. The attributes of the BWR Vessel ID Attachment Welds Program related to maintaining reactor coolant water chemistry are included in the applicant's Water Chemistry Control Program.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.4, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.4.7 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR and USAR Supplements for this program, the project team finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.5 BWR FEEDWATER NOZZLE PROGRAM (NMP AMP B2.1.5)

In NMP ALRA, Appendix B, Section B2.1.5, the applicant states that NMP AMP B2.1.5, "BWR Feedwater Nozzle Program," is an existing plant program that is consistent with GALL AMP XI.M5, "BWR Feedwater Nozzle," with an exception.

2.5.1 Program Description

The applicant states, in the NMP ALRA, that its BWR Feedwater Nozzle Program is an existing program that requires UT inspections of the feedwater nozzles every 10 years to verify that the nozzles are acceptable for continued service.

The applicant also states, in the NMP ALRA, that its BWR Feedwater Nozzle Program is implemented through its Inservice Inspection Program which, at the time the license renewal application was submitted, conformed to the requirements in ASME Code, Section XI, Subsection IWB, Table IWB 2500-1 (1989 Edition no Addenda), and ASME Section XI, Appendix VIII, 1995 Edition through 1996 Addenda, "Performance Demonstration for Ultrasonic Examination Systems," to ASME Section XI, Division 1.

The applicant further states, in the NMP ALRA, that UT and penetrant testing (PT) inspections required by NUREG-0619 have been superseded because the inspections are now performed in accordance with ASME Section XI, Appendix VIII.

2.5.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.5 is consistent with GALL AMP XI.M5, with an exception.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.5, including program basis document, LR-PBD-FWNZL, "BWR Feedwater Nozzle," which provides an assessment of the AMP elements' consistency with GALL AMP XI.M5.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.5 and associated basis documents against GALL AMP XI.M5 for consistency.

The project team reviewed those portions of the BWR Feedwater Nozzle Program for which the applicant claims consistency with GALL AMP XI.M5 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's BWR Feedwater Nozzle Program provides reasonable assurance that aging management of cracking of feedwater nozzles will be performed. The project team finds the applicant's BWR Feedwater Nozzle Program acceptable because it conforms to the recommended GALL AMP XI.M5, "BWR Feedwater Nozzle," with the exception as described below.

2.5.3 Exceptions to the GALL Report

The applicant states, in the NMP ALRA, that the exception to the GALL Report program description is as follows:

> Exception: The exception to GALL AMP XI.M5, is that the NMP Inservice Inspection Program does not comply with the specific Edition and Addenda of ASME Section XI cited in the GALL Report because the program is updated to the latest Edition and Addenda of ASME Section XI, as mandated by 10 CFR 50.55a, prior to the start of each inspection interval.
>
> This exception (i.e., updating the ISI Program to the latest Edition and Addenda of ASME Section XI, as mandated by 10 CFR 50.55a) is acceptable because the NMP ISI Programs meet the intent of GALL AMP XI.M5, in that the feedwater nozzles are subject to ASME Section XI requirements.

The GALL Report identifies the following recommendation for the "program description" associated with the exception taken:

> This program includes (a) enhanced inservice inspection in accordance with the requirements of the ASME Code, Section XI, Subsection IWB, Table IWB 2500-1 (1995 Edition through the 1996 Addenda) and the recommendation of General Electric (GE) NE-523-A71-0594, and (b) system modifications to

mitigate cracking. The program specifies periodic ultrasonic inspection of critical regions of BWR feedwater nozzle.

The applicant states, in the NMP ALRA, that there was one exception to the GALL Report. The program described in GALL AMP XI.M5, cites ASME Section XI requirements covered in the 1995 Edition through the 1996 Addenda. The IWB/C/D ISI Programs for NMP are based on the 1989 Edition with no addenda and ASME Section XI, Appendix VIII, 1995 Edition through 1996 Addenda. The project team noted that the code of record is updated and approved by the NRC staff for each inspection interval in accordance with 10 CFR 50.55a. On this basis, the project team finds this exception acceptable.

2.5.4 Enhancements

None

2.5.5 Operating Experience

The applicant states, in the NMP ALRA, that no industry experience was identified that indicates that existing programs and practices will not be effective in the timely identification of feedwater nozzle cracking.

The project team concluded that the applicant’s BWR Feedwater Nozzle Program provides reasonable assurance that aging effects/mechanisms due to cracking in the feedwater nozzles are adequately managed so that their intended functions, consistent with the CLB, are maintained during the period of extended operation.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant’s BWR Feedwater Nozzle Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.5.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the BWR Feedwater Nozzle Program in NMP ALRA, Appendix A, Section A1.1.7 for NMP Unit 1 and Section A2.1.8 for NMP Unit 2, respectively, which state that its BWR Feedwater Nozzle Program is implemented through its Inservice Inspection Program which, at the time the license renewal application was submitted, conformed to the requirements in ASME Code, Section XI, Subsection IWB, Table IWB 2500-1 (1989 Edition no Addenda), and ASME Section XI, Appendix VIII, “Performance Demonstration for Ultrasonic Examination Systems,” 1995 Edition through 1996 Addenda. GALL AMP XI.M5 identifies the 1995 Edition (including the 1996 Addenda) of ASME Section XI as the basis for the GALL Report’s Feedwater Nozzle Program. The applicant’s Inservice Inspection Programs will not comply with the Edition and Addenda of ASME Section XI cited in the GALL Report because the programs are updated to the latest Edition and Addenda of ASME Section XI, as mandated by 10 CFR 50.55a, prior to the start of each inspection interval.

In addition, the applicant states, in its UFSAR and USAR Supplements that UT and PT inspections required by NUREG-0619 have been superseded because the inspections are now performed in accordance with ASME Section XI, Appendix VIII.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.5, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.5.7 Conclusion

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, the project team has reviewed the exception and the associated justifications and determined that the AMP, with the exception is adequate to manage the aging effects/mechanisms for which it is credited. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.6 BWR STRESS CORROSION CRACKING PROGRAM (NMP AMP B2.1.6)

In NMP ALRA, Appendix B, Section B2.1.6, the applicant states that NMP AMP B2.1.6, "BWR Stress Corrosion Cracking Program," is an existing plant program that is consistent with GALL AMP XI.M7, "BWR Stress Corrosion Cracking," with an exception.

2.6.1 Program Description

The applicant states, in the NMP ALRA, that this program manages intergranular stress corrosion cracking (IGSCC) in reactor coolant pressure boundary piping made of stainless steel as delineated in NUREG-0313, Revision 2 and Generic Letter 88-01 and its Supplement 1, as modified by BWRVIP-75. Augmented inspections are performed in accordance with these documents. The attributes of the applicant's BWR Stress Corrosion Cracking Program related to maintaining reactor coolant water chemistry are included in NMP AMP B2.1.2, "Water Chemistry Control Program."

2.6.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.6 is consistent with GALL AMP XI.M7, with an exception.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.6, including program basis document, LR-PBD-SCC, "BWR Stress Corrosion Cracking (Units 1 and 2)," which provides an assessment of the AMP element's consistency with GALL AMP XI.M7.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.6 and associated basis documents against GALL AMP XI.M7 for consistency.

During its audit and review, the project team noted that NMP credits Revision 1 and Revision 2 of the EPRI TR-103515 guidelines for its reactor coolant water chemistry instead of the GALL Report recommended guidelines in BWRVIP-29. The applicant states that the "preventive actions" program element is addressed in its Water Chemistry Control Program. The project team reviewed the applicant's Water Chemistry Control Program and its evaluation is documented in Section 2.2 of this audit and review report. On the basis of its review, the project team finds this acceptable.

The project team reviewed those portions of the BWR Stress Corrosion Cracking Program for which the applicant claims consistency with GALL AMP XI.M7 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's BWR Stress Corrosion Cracking Program provides reasonable assurance that aging effects/mechanisms for the BWR coolant pressure boundary piping will be managed so that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis through the period of extended operation. The project team finds the applicant's BWR Stress Corrosion Cracking Program acceptable because it conforms to the recommended GALL AMP XI.M7, "BWR Stress Corrosion Cracking," with the exception as described below.

2.6.3 Exceptions to the GALL Report

The applicant states, in the NMP ALRA, that the exception to the GALL Report program element is as follows:

Element: 6: Acceptance Criteria
Exception: The current licensing basis for NMP is based on the 1989 Edition of ASME Section XI, whereas the GALL Report identifies the 1995 Edition with the 1996 Addenda of the ASME Section XI Code.

The GALL Report identifies the following recommendation for the "acceptance criteria" program element associated with the exception taken:

> As recommended in NRC GL 88-01, any indication detected is evaluated in accordance with the ASME Section XI, Subsection IWB-3640 (1995 Edition through the 1996 Addenda).

The project team compared the differences between the 1989 Edition and the 1995 Edition through 1996 Addenda of ASME Section XI, Subsection IWB-3640. The project team finds that the acceptance criteria identified in the 1989 Edition is more conservative than the acceptance criteria identified in the 1995 Edition through 1996 Addenda. Subsection IWB-3640 in the 1989 Edition sets the acceptable flaw depth upper limit as 60% of the wall thickness, whereas IWB-3640 in the 1995 Edition through 1996 Addenda sets the acceptable flaw depth upper limit as 75% of the wall thickness for the shielded metal-arc welds and submerged arc welds. On this basis, the project team finds this exception acceptable.

2.6.4 Enhancements

None

2.6.5 Operating Experience

The applicant states, in the NMP ALRA, that it has reviewed both industry and plant-specific operating experience relating to BWR stress corrosion cracking. Along with other plants in the BWR fleet, NMP has found indications of IGSCC in recirculation system piping and welds that were evaluated and dispositioned in accordance with the applicable ISI Program plan. The plant continuously reviews industry operating experience to determine its applicability to NMP and adjusts inspection plans accordingly. Plant-specific operating experience is reviewed and trended; findings are documented, reviewed, and resolved; corrective actions are taken; and mitigative actions to limit aging initiated.

The project team reviewed the applicant's corrective action program, which revealed that DERs were initiated when ISI inspections found SCC in the reactor coolant system. The following is a list of typical DERs for SCC:

- DER-NM-1997-877 - UT examination during ISI of weld in the recirculation system piping found an indication 1.25 inches long and 0.25 inches deep. SCC was stated as the probable cause for the indication.

- DER-U1-1999-1255 - During RFO 15, ultrasonic inspections were performed on reactor recirculation system welds in accordance with Generic Letter 88-01 and ASME Code Section XI requirements. Two welds were identified with circumferential indications near the weld root that exceeded the acceptance criteria in the ASME Code, Section XI, Paragraph IWB-3514.3. During the resulting first and second expanded scope inspections of System 32 welds, rejectable indications were discovered in an additional two welds. The rejectable conditions originally found during ISI examination of welds 046 and 086 were reported in this DER. This disposition covers the affected welds identified in this DER description plus weld 126 (reported on DER 1-1999-1411) and weld 168 (reported on DER 1-1999-1559), because the apparent cause for rejection is similar among these welds. An additional weld was inspected as part of the first expanded scope and found acceptable.

The project team finds that the operating experience indicates that the BWR Stress Corrosion Cracking Program at NMP has shown to be generally effective in managing aging effects/mechanisms in BWR coolant pressure-retaining boundary piping.

The project team also reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's BWR Stress Corrosion Cracking Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.6.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the BWR Stress Corrosion Cracking Program in NMP ALRA, Appendix A, Section A1.1.10 for NMP Unit 1 and Section A2.1.11 for NMP Unit 2, respectively, which state that the BWR Stress Corrosion Cracking Program manages intergranular stress corrosion cracking in reactor coolant pressure boundary piping made of stainless steel as delineated in NUREG-0313, Revision 2 and Generic Letter 88-01 and its Supplement 1, as modified by BWRVIP-75. Augmented inspections are performed in accordance with these documents. An exception to the program described in the GALL Report is that the acceptance criteria for the applicant's BWR Stress Corrosion Cracking Program is based upon the 1989 Edition of the ASME Section XI Code versus the 1995 Edition through the 1996 Addenda as described in the GALL Report. The applicant also states that the attributes of its BWR Stress Corrosion Cracking Program related to maintaining reactor coolant water chemistry are included in its Water Chemistry Control Program.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.6, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.6.7 Conclusion

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, the project team has reviewed the exception and the associated justification and determined that the AMP, with the exception is adequate to manage the aging effects/mechanisms for which it is credited. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.7 BWR PENETRATIONS PROGRAM (NMP AMP B2.1.7)

In NMP ALRA, Appendix B, Section B2.1.7, the applicant states that NMP AMP B2.1.7, "BWR Penetrations Program," is an existing plant program that is consistent with GALL AMP XI.M8, "BWR Penetrations."

2.7.1 Program Description

The applicant states, in the NMP ALRA, that this program manages the effects of cracking in the various penetrations of the reactor pressure vessels at NMP. The applicant's BWR Penetrations Program is based on guidelines issued by the BWRVIP and approved by the NRC. Implementation of the applicant's BWR Penetrations Program is discussed in the program description for NMP AMP B2.1.8, "BWR Vessel Internals Program." The attributes of the applicant's BWR Penetrations Program related to maintaining reactor coolant water chemistry are included in NMP AMP B2.1.2, "Water Chemistry Control Program."

2.7.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.7 is consistent with GALL AMP XI.M8.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.7, including program basis document, LR-PBD-VSSLPENS, "BWR Penetrations (Units 1 and 2)," which provides an assessment of the AMP element's consistency with GALL AMP XI.M8.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.7 and associated basis documents against GALL AMP XI.M8 for consistency.

During its audit and review, the project team noted that NMP credits Revision 1 and Revision 2 of the EPRI TR-103515 guidelines for its reactor coolant water chemistry instead of the GALL Report recommended guidelines in BWRVIP-29. The applicant states that the "preventive actions" program element is addressed in its Water Chemistry Control Program. The project team reviewed the applicant's Water Chemistry Control Program and its evaluation is documented in Section 2.2 of this audit and review report. On the basis of its review, the project team finds this acceptable.

The project team reviewed those portions of the BWR Penetrations Program for which the applicant claims consistency with GALL AMP XI.M8 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's BWR Penetrations Program provides reasonable assurance that the effects of cracking in the various penetrations of the reactor pressure vessels are adequately managed. The project team finds the applicant's BWR Penetrations Program acceptable because it conforms to the recommended GALL AMP XI.M8, "BWR Penetrations."

2.7.3 Exceptions to the GALL Report

None

2.7.4 Enhancements

None

2.7.5 Operating Experience

The applicant states, in the program basis document, that operating experience issues affecting NMP Unit 1 include core shroud cracking, shroud support weld cracking, CRD stub tube penetration IGSCC cracking and leakage, and top guide cracking. Operating experience issues identified at NMP Unit 2 include core shroud cracking and jet pump wedge wear. No other significant cracking has been identified for vessel internals at either unit. The applicant also states that program changes and updates have resulted from the ongoing review of industry operating experience and regulatory notices, as these are regularly reviewed for applicability to the reactor vessel internals. NMP closely monitors the activity in the BWRVIP and ASME Section XI Code Committees. In these ways, the applicant addresses vessel internal degradation noted at other BWRs in a systematic manner, and revises the BWRVIP inspections accordingly.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant’s technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant’s technical staff, the project team concludes that the applicant’s BWR Penetrations Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

The project team reviewed the operating experience provided in the program basis document, and interviewed the applicant's technical staff to confirm that no industry operating experience with penetration and nozzle cracking has emerged since the release of BWRVIP-49 and BWRVIP-27.

The project team recognizes that the corrective action program, which captures internal and external plant operating experience issues, will ensure that operating experience is reviewed and incorporated in the future to provide objective evidence to support the conclusion that the effects of aging are adequately managed.

2.7.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the BWR Penetrations Program in NMP ALRA, Appendix A, Section A1.1.8 for NMP Unit 1 and Section A2.1.9 for NMP Unit 2, respectively, which state that the BWR Penetrations Program manages cracking in the various penetrations of the reactor pressure vessels at NMP. This program is based on guidelines issued by the BWRVIP and approved by the NRC. The applicant's BWR Penetrations Program is implemented by its BWR Vessel Internals Program for managing specific aging effects/mechanisms. The attributes of the applicant's BWR Penetrations Program related to maintaining reactor coolant water chemistry are included in its Water Chemistry Control Program.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.7, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.7.7 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR and USAR Supplements for this program, the project team finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.8 BWR VESSEL INTERNALS PROGRAM (NMP AMP B2.1.8)

In NMP ALRA, Appendix B, Section B2.1.8, the applicant states that NMP AMP B2.1.8, "BWR Vessel Internals Program," is an existing plant program that is consistent with GALL AMP XI.M9, "BWR Vessel Internals," with enhancements.

2.8.1 Program Description

The applicant states, in the NMP ALRA, that this program manages aging of materials inside the reactor vessel. Program activities include (1) inspections for the presence and effects of cracking; and (2) monitoring and control of water chemistry. This program is based on guidelines issued by the BWRVIP and approved (or pending approval) by the NRC. The attributes of the applicant's BWR Vessel Internals Program related to maintaining reactor coolant water chemistry are included in NMP AMP B2.1.2, "Water Chemistry Control Program." Inspections and evaluations of reactor vessel components are consistent with the guidelines of applicable and staff-approved BWRVIP reports.

2.8.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.8 is consistent with GALL AMP XI.M9, with enhancements.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.8, including program basis document, LR-PBD-RVI, "BWR Vessel Internals (Units 1 and 2)," which provides an assessment of the AMP elements' consistency with GALL AMP XI.M9.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.8 and associated basis documents against GALL AMP XI.M9 for consistency.

During the audit and review, the project team noted that the applicant credits Revision 1 and Revision 2 of the guideline in EPRI TR-103515, "BWR Water Chemistry Guidelines – 1996" for its reactor coolant water chemistry instead of the GALL Report recommended guidelines in BWRVIP-29. The applicant states that the "preventive actions" program element is addressed in its Water Chemistry Control Program. The project team reviewed the applicant's Water Chemistry Control Program and its evaluation is documented in Section 2.2 of this audit and review report. On the basis of its review, the project team finds this acceptable.

During the audit and review, the project team asked the applicant to clarify that BWRVIP-62, "BWR Vessel and Internals Project, Technical Basis for Inspection Relief for BWR Internal Components with Hydrogen Injection," is not NRC-approved but is cited in the GALL Report and what its plan is with respect to BWRVIP-62. During the audit and review, the applicant responded that BWRVIP-62 allowed inspection relief for plants using HWC. Furthermore, the applicant responded that NMP Unit 2 credited BWRVIP-62 in a shroud evaluation during 2000-2004, but is not currently invoking BWRVIP-62 and NMP Unit 1 has never taken credit for HWC in shroud reinspection evaluations. In the future, the applicant plans to take credit for the relief allowed by BWRVIP-62 when the document is approved for license renewal by the NRC. The project team finds this acceptable.

The project team reviewed those portions of the BWR Vessel Internals Program for which the applicant claims consistency with GALL AMP XI.M9 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's BWR Vessel Internals Program provides reasonable assurance that aging effects for vessel internals will be managed so that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis through the period of extended operation. The project team finds the applicant's BWR Vessel Internals Program acceptable because it conforms to the recommended GALL AMP XI.M9, "BWR Vessel Internals," with the enhancements as described below.

2.8.3 Exceptions to the GALL Report

None

2.8.4 Enhancements

The applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

Element: 4: Detection of Aging Effects
Enhancement: NMP will address open items regarding the inspection of inaccessible welds for core spray, jet pump, and low pressure coolant injection (LPCI) components, respectively. (Commitment 13 for NMP Unit 1 and NMP Unit 2)

The GALL Report identifies the following recommendation for the "detection of aging effects" program element associated with the enhancement:

> The extent and schedule of the inspection and test techniques prescribed by the applicable and approved BWR Vessel Internals Program guidelines. In the BWR Vessel Internals Program renewal applicant action items, it states the BWRVIP committed to address development of the technology to inspect inaccessible weld and to have the individual license renewal applicant notify the NRC of actions planned. Applicants referencing the BWRVIP report for license renewal should identify this action as open and to be addressed once the BWRVIP's response to this issue has been reviewed and acceptable by the staff.

The applicant states, in the NMP ALRA, that BWRVIP-18, "BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines," BWRVIP-41, "BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines (NMP Unit 2 Only)," and BWRVIP-42, "LPCI Coupling Inspection and Flaw Evaluation Guidelines (NMP Unit 2 Only)" identify open items regarding the inspection of inaccessible welds for core spray, jet pump, and LPCI components, respectively. The applicant also states that it will implement the resolution of these open items as documented in the BWR Vessel Internals Program response which is to be reviewed and accepted by the NRC. These three open items are applicable to NMP Unit 2. For NMP Unit 1, only the open item for core spray components is applicable due to the design of the plant. The project team finds that this enhancement addresses the renewal application open items. On this basis, the project team finds this enhancement acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

The applicant further states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

Element: 4: Detection of Aging Effects
Enhancement: Steam dryers inspection
(Commitment 13 for NMP Unit 1 and NMP Unit 2)

The GALL Report identifies the following recommendation for the "detection of aging effects" program element associated with the enhancement:

> A plant-specific aging management program is to be evaluated to address aging effects of cracking due to flow-induced vibration for the stainless steel steam dryers.

The applicant states, in the NMP ALRA, that the inspection and evaluation guidelines for steam dryers are currently under development by the BWR Vessel Internals Program committee. Once these guidelines are documented, and reviewed and accepted by the NRC, the actions will be implemented at NMP Unit 1 and NMP Unit 2 in accordance with the BWR Vessel Internals Program. The project team is aware that BWRVIP-139, "BWR Vessel and Internals Project, Steam Dryer Inspection and Flaw Evaluation Guidelines," was issued by the BWR Vessel Internals Program and is under NRC review to address steam dryer inspection activities. The project team finds this enhancement is consistent with the GALL Report. On this basis, the project team finds this enhancement acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

In addition, the applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

Element:	4: Detection of Aging Effects
Enhancement:	Access Cover Holes Inspection (Commitment 13 for NMP Unit 2)

The GALL Report identifies the following recommendation for the "detection of aging effects" program element associated with the enhancement:

> An augmented inspection is to include ultrasonic testing (UT) or other demonstrated acceptable inspection of the access hole covers welds.

The applicant states, in the NMP ALRA, that the inspection and evaluation guidelines for access hole covers are currently under development by the BWR Vessel Internals Program committee. Once these guidelines are documented, and reviewed and accepted by the NRC, the actions will be implemented at NMP Unit 2 in accordance with the BWR Vessel Internals Program. This issue is not applicable to NMP Unit 1 due to the design of the plant. The project team finds that, currently, the inspection of access cover holes is per GE SIL and the BWR Vessel Internals Program will develop guidelines for the inspection of access hole covers. On the basis that the applicant's enhancement is consistent with the GALL Report, the project team finds this enhancement acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

Furthermore, the applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

Element:	4: Detection of Aging Effects
Enhancement:	The baseline inspections for the BWR lower plenum components will be incorporated into the appropriate program and implementing documents. (Commitment 13 for NMP Unit 1 and NMP Unit 2)

The GALL Report references applicable and approved BWRVIP guidelines for inspection recommendations for selected components and locations. For the lower plenum, BWRVIP-47, “BWR Lower Plenum Inspection and Flaw Evaluation Guidelines” identifies the following recommendation for the “detection of aging effects” program element associated with the enhancement:

> A baseline inspection recommended, as identified in Section 3.2.2 of BWRVIP-47, to be performed to determine the condition of the component/location.

The applicant states, in the NMP ALRA, that the baseline inspections recommended in BWRVIP-47 for the BWR lower plenum components will be incorporated into the appropriate program and implementing documents. The project team finds that this enhancement will meet the recommendation of the BWRVIP-47. On this basis, the project team finds this enhancement acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

The applicant also states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

Element:	4: Detection of Aging Effects
Enhancement:	Top guide inspection regarding BWRVIP-26 (Commitment 13 for NMP Unit 1 and NMP Unit 2)

The GALL Report identifies the following recommendation for the “detection of aging effects” program element associated with the enhancement:

> The top guide inspection locations are those that have high neutron fluences exceeding the irradiation-assisted stress corrosion cracking (IASCC) threshold. The extent of the examination and its frequency will be based on a ten percent sample for the total population, which includes all grid beam and beam-to-beam crevice slots.

The applicant states, in the NMP ALRA, that a schedule for additional inspections of the top guide locations (using EVT-1 or techniques demonstrated to be appropriate in BWRVIP-03, “BWR Vessel and Internals Project, Reactor Pressure Vessel and Internals Examination Guidelines”) will be incorporated into the appropriate program and implementing documents. A minimum of 10% of the locations will be inspected within 12 years of the beginning of the period of extended operation, with at least 5% of the inspections completed within six years. During the audit and review, the project team noted that the inspection commitment is within 12 years of the beginning of the period of extended operation only. The project team asked the applicant to confirm that the commitment also addresses subsequent intervals. The project team reviewed the latest NMP Unit 1 top guide inspection findings and requested that the applicant provide additional plant-specific information regarding the reinspection and scope expansion to additional locations. In a letter dated December 1, 2005, the applicant provides its plant-specific information regarding the top guide inspection as follows:

- Prior to 2003, the NMP Unit 1 top guide fluence was estimated, using the latest best estimate transport techniques, to have exceeded the GALL Report identified 5E20 n/cm^2 threshold for IASCC concerns.

- Consistent with the GALL Report guidance and GE SIL 554 recommendations, NMP Unit 1 implemented the recommended EVT-1 sample inspection in 2003 (Refueling Outage 17 (RFO17)) and found one crack.

- In the subsequent 2005 outage (RFO18), NMP Unit 1 expanded the inspection scope to include all accessible top guide grid beam locations using UT inspection methods. The scope expansion achieved essentially 95% coverage of the grid beam. This scope expansion and the UT inspection method are fully consistent with the current guidance in BWRVIP-26, "BWR Vessel and Internals Project, Top Guide Inspection and Flaw Evaluation Guidelines" and with GE SIL 554 which was specifically issued for the top guide grid beam. This UT inspection verified the presence of the crack that was identified by the 2003 EVT-1 examination and identified five others.

- DER 2005-1614 provides the disposition of the indications identified in the 2005 inspection. The DER disposition references the NMP Unit 1 flaw handbook and justifies at least one operating cycle prior to the next inspection. The DER corrective actions include a reanalysis of the as-found condition and the definition of the appropriate inspection scope and frequency. This resultant plan is consistent with the guidance provided in BWRVIP-26 for top guide grid beam flaw analysis (i.e., to perform a plant-specific flaw analysis to define the structural margin and the appropriate inspection interval and scope) to which NMP is committed.

In a letter dated December 1, 2005, the applicant also states that the top guide grid beam inspection sample plan discussed in the GALL Report is a sample program. At NMP Unit 1, the existing inspection program included a sample inspection similar to the GALL Report recommendation and the program has identified top guide cracking.

BWRVIP-26 does not identify any inspection plan for the top guide. The BWRVIP-47 sample inspection plan was chosen for the top guide grid beam. NMP Unit 1 implemented a scope expansion inspection of the grid beam during RFO18 (2005) as a result of the inspection results from RFO17 (2003). This scope expansion was performed using UT inspection methods which achieved approximately 95% coverage of the grid beam. The volumetric coverage was capable of detecting flaws through the height of both the upper and lower grid beams and at the intersections. The 2005 UT inspection is considered to be the NMP Unit 1 top guide grid beam baseline inspection identified in the BWRVIP-47 guidance. The project team finds the applicant's sample inspection plan acceptable and concludes that the program identified in the NMP ALRA need enhancements to meet its sample inspection plan. During the audit and review, the applicant stated that NMP will (1) revise its program basis document to address inspection locations and frequency for re-inspection; (2) revise the NMP ALRA, Appendix A, Sections A1.1.12 and A1.4 and Section B2.1.8 to address the top guide inspection enhancement; and (3) revise the NMP ALRA, Appendix A, Sections A2.1.13 and A2.4 and Section B2.1.8 to address the top guide inspection enhancement. In a letter dated December 1, 2005, the applicant provides its revisions to the NMP ALRA as follows:

> In Sections A1.1.12 and A1.4, the existing enhancement and commitment on top guide inspections for NMP Unit 1 will be revised to address re-inspection frequency as follows:
>
>> The reinspection scope and frequency for the grid beam going forward will be based on BWRVIP-26 guidance for plant-specific flaw analysis and crack growth assessment. The maximum reinspection interval for the grid beam will not exceed 10 years, consistent with standard BWRVIP guidance for the core shroud. The reinspection scope will be equivalent to the UT baseline 2005 inspection scope. In addition, the reinspection scope will include an EVT-1 sample inspection of at least two locations with accessible indications within the initial six years of the 10 year interval. The intent of the EVT-1 is to monitor the known cracking to confirm flaw analysis crack growth assumptions.
>
> In Sections A2.1.13 and A2.4, the existing enhancement and commitment to perform the top guide inspections for NMP Unit 2 will be revised as follows:
>
>> NMP Unit 2 will perform inspections of the guide beams similar (in inspection methods, scope and frequency of inspection) to the inspections specified in BWRVIP-47 for the control rod guide tube components. The extent of examination and its frequency will be based on a ten percent sample of the total population, which includes all grid beam and beam-to-crevice slots, being inspected within 12 years of entry into the period of extended operation with five percent of the population being inspected within the first six years. The sample locations selected for examination will be in areas that are exposed to the highest neutron fluence. The top guide grid beam reinspection requirements will depend on the inspection results; however, at a minimum, the applicant's BWR Vessel Internals Program will follow the same guidance for the subsequent 12 year interval as defined for the initial 12 year baseline.
>
> In Section B2.1.8, the existing enhancement to the "detection of aging effects" program element to perform the top guide inspections will be revised as follows:
>
>> The reinspection scope and frequency for the NMP Unit 1 grid beam going forward will be based on BWRVIP-26 guidance for plant-specific flaw analysis and crack growth assessment. The maximum reinspection interval for the grid beam will not exceed 10 years, consistent with standard BWR Vessel Internals Program

> guidance for the core shroud. The reinspection scope will be equivalent to the UT baseline 2005 inspection scope. In addition, the reinspection scope will include an EVT-1 sample inspection of at least two locations with accessible indications within the initial six years of the 10 year interval. The intent of the EVT-1 is to monitor the known cracking to confirm flaw analysis crack growth assumptions.
>
> NMP Unit 2 will perform inspections of the guide beams similar (in inspection methods, scope and frequency of inspection) to the inspections specified in BWRVIP-47 for the control rod guide tube components. The extent of examination and its frequency will be based on a ten percent sample of the total population, which includes all grid beam and beam-to-crevice slots, being inspected within 12 years of entry into the period of extended operation with five percent of the population being inspected within the first six years. The sample locations selected for examination will be in areas that are exposed to the highest neutron fluence. The top guide grid beam reinspection requirements will depend on the inspection results; however, at a minimum, the applicant's BWR Vessel Internals Program will follow the same guidance for the subsequent 12 year interval as defined for the initial 12 year baseline.

On the basis that the applicant's enhancement is consistent with the GALL Report recommendations, the project team finds this enhancement acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

The applicant also states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

Element:	7: Corrective Actions
Enhancement:	Control Rod Drive (CRD) Stub Tube Repair (Commitment 36 for NMP Unit 1)

The GALL Report identifies the following recommendation for the "corrective actions" program element associated with the enhancement:

> Repair and replacement procedures are equivalent to those requirements in ASME Section XI.

In a letter dated January 13, 2005 (ML050130283), the NRC issued RAI 3.1.2-1 to ask the applicant to address the difference between the alternative repair roll/expansion techniques and the ASME Code acceptable weld repair for those NMP Unit 1 CRD stub tube penetrations leakage. In a letter dated February 14, 2005 (ML050610059), the applicant provides its response to RAI 3.1.2-1, stating that, "NMP committed to implement a strategy whereby during the period of extended operation a leaking control rod drive (CRD) stub tube penetration would be roll repaired. If following the roll repair, this stub tube was to leak within acceptable limits, then a weld repair would be effected no later than one operating cycle following discovery of the leakage." The applicant states, in the NMP ALRA, that it will follow the status of the proposed ASME Code change with respect to allowing roll/expansion techniques of CRD stub tubes and will implement the final code change or provide an alternative plan for the NMP Unit 1 period of extended operation. This will be accomplished at least one year prior to the expiration of the current operating license.

During the audit and review, the project team noted that the wording in NMP ALRA Table 3.1.1.A and in the applicant's response to RAI 3.1.2-1 imply that NMP Unit 1 will operate with CRD stub tube leakage for one operating cycle (two years). The project team does not consider this acceptable for the period of extended operation. The NRC's safety evaluation, dated March 25, 1987, which allows NMP Unit 1 to operate with CRD stub tube leakage, was only acceptable as a temporary repair. Specifically, Item (6) of the NRC's conclusions of the aforementioned safety evaluation, states that, "The proposed leakage criteria provides sufficient time to complete the final development of the prototype mechanical seal and associated tooling and investigate other methods such as weld repair." In a letter dated November 2, 2005 (ML053070131), the project team asked the applicant, in RAI 3.1.2-1, to address CRD stub tube leaking for one additional operating cycle.

In a letter dated November 30, 2005 (ML053410383), the applicant provides its response to RAI 3.1.2-1 to address CRD stub tube penetration repair issue. In its response, the applicant revised NMP ALRA Section 2.1.8, Commitment 36 in NMP ALRA Section A1.4, and NMP ALRA Table 3.1.1.A, Item 3.1.1.A-30 to clarify its position, as described below, related to the use of roll/expansion techniques for the repair of leaking NMP Unit 1 CRD stub tubes as follows:

The second paragraph of NMP ALRA Table 3.1.1.A, Item 3.1.1.A-30 (Page 3.1-29), Commitment 36 of NMP ALRA Section A1.4 (Page A1-42), and the Corrective Action bullet in NMP ALRA Section B2.1.8 (Page B2-25) is replaced with the following:

> If the 10/19/05 draft of Code Case N-730 is approved by the ASME, NMP Unit 1 will implement the final code case as conditioned by the NRC. If the code case is not approved by the ASME, NMP Unit 1 will seek NRC approval of the 10/19/05 code case draft on a plant specific basis as conditioned by the NRC.

During the period of extended operation, should a CRD stub tube rolled in accordance with the provisions of the code case resume leaking, NMP will implement one of the following zero leakage permanent repair strategies prior to startup from the outage in which the leakage was detected:

1. A welded repair consistent with BWRVIP-58-A, "BWRVIP Internal access Weld Repair" and Code Case N-606-1, as endorsed by the NRC in Regulatory Guide 1.147.

2. A variation of the welded repair geometry specified in BWRVIP-58-A subject to the approval of the NRC using Code Case N-606-1.

3. A future developed mechanical/welded repair method subject to the approval of the NRC.

The project team reviewed the applicant’s response. The project team finds this acceptable since this change meets the GALL Report recommendation. On this basis, the project team finds this enhancement acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

In a letter dated November 17, 2005 (ML053320201), the applicant revised its original enhancement in meeting the GALL Report program element as follows:

Element:	3: Parameters Monitored/Inspected
Enhancement:	Management of fracture toughness of NMP Unit 1 and NMP Unit 2 Cast Austenitic Stainless Steel (CASS) components (Commitment 37 for NMP Unit 1 and Commitment 35 for NMP Unit 2)

The GALL Report identifies the following recommendation for the “parameters monitored/inspected” program element associated with the enhancement:

> For cast austenitic stainless steel components, the aging effect of loss of fracture toughness due to thermal aging and neutron irradiation embrittlement shall be managed through either supplemental examination or component-specific evaluation.

The applicant states, in the NMP ALRA, that maintenance procedures for the inspection of the orificed fuel support casting will be enhanced to include a sample VT-1 inspection of the casting and an EVT-1 inspection if any evidence of impact or mishandling is identified. In a letter dated November 17, 2005, the applicant provided its self-identified changes and its basis for change to the NMP ALRA for the management of the fracture toughness of NMP Unit 1 and NMP Unit 2 CASS components with the BWR Vessel Internals Program as follows:

> In Sections A1.1.12, A2.1.13 and B2.1.8, clarify that the program activities include effects on fracture toughness due to neutron fluence and thermal embrittlement by 1) replacing the last bullet on Page A1-6 of Section A1.1.12; 2) replacing the last bullet on Page A2.6 of Section A2.1.13; and 3) replacing the text under the “parameters monitored/inspected” program element in NMP AMP B2.1.8 with the following:
>
>> Enhance the program to evaluate component susceptibility to loss of fracture toughness. Assessments and inspections will be performed, as necessary to ensure that intended functions are not impacted by the aging effect.

In Sections A1.4 and A2.4, replace the commitments in Item 37 of Section A1.4 and Item 35 in Section A2.4 as follows:

> Enhance the program to evaluate component susceptibility to loss of fracture toughness. Assessments and inspections will be performed, as necessary to ensure that intended functions are not impacted by the aging effect.

The project team reviewed the applicant's self-identified NMP ALRA change. The project team finds this acceptable since its change meets the GALL Report's recommendation. On this basis, the project team finds this enhancement acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

In a letter dated December 1, 2005, the applicant provides an additional enhancement to address as follows:

Element: 3: Parameters Monitors/Inspected

Enhancement: Inspect additional locations to address the aging management for reactor vessel feedwater nozzle thermal sleeves and control rod drive return line nozzle thermal sleeve.
(Commitment 38 for NMP Unit 1 and Commitment 37 for NMP Unit 2)

An EVT-1 examination of the NMP Unit 1 and NMP Unit 2 feedwater sparger end bracket welds will be performed. The inspection extent and frequency of the end bracket weld inspection will be the same as the ASME Section XI inspection of the feedwater sparger bracket vessel attachment welds. If the final fabrication review of the NMP Unit 2 feedwater thermal sleeves concludes that the hidden welds are not IGSCC susceptible, the NMP Unit 2 inspections will be discontinued, as applicable.
(Commitment 38 for NMP Unit 1 and Commitment 37 for NMP Unit 2)

NMP Unit 1 will perform an EVT-1 inspection of the thermal shield to flow shield weld starting 2007 and proceeding at a 10 year frequency thereafter consistent with the ISI inspection interval.
(Commitment 40 for NMP Unit 1)

In a letter dated September 15, 2005 (ML052700377), the applicant states that its BWR Feedwater Nozzle Program and BWR Control Rod Drive Return Line (CRDRL) Nozzle Program were removed as the credited programs for the feedwater nozzle and CRDRL nozzle thermal sleeves. During the audit and review, the project team asked the applicant to address the aging management for the thermal sleeves. In a letter dated December 1, 2005, the applicant states that NMP will use inspections performed under its BWR Vessel Internals Program, using surrogate components that are more readily accessible for examination. For NMP Unit 1, the surrogate components will be the feedwater sparger end bracket welds. In this letter, the applicant also provided its basis for choosing the feedwater sparger end bracket welds as follows:

> The NMP Unit 1 feedwater nozzle thermal sleeves are fabricated from nickel-based Alloy 600 (Inconel 600). A full penetration weld joins the thermal sleeve to the outboard end of the carbon steel feedwater sparger. This weld was made with Alloy 82 and Alloy 182 weld fillers. The thermal-sleeve to sparger weld, or the heat affected zone in the Alloy 600 base material, is considered the most likely location for IGSCC in the thermal sleeve.

The applicant adds that each feedwater sparger is supported by end brackets which provide a spring force that helps hold the thermal sleeve in place. The feedwater sparger end bracket welds consist of three welds: the sparger arm to sparger end plate welds (Weld #1), sparger end plate to bracket end plate weld (Weld #2), and the sparger bracket end plate to end bracket assembly welds (Weld #3), which are dissimilar metal welds that use Alloy 182 or 82 weld fillers.

In addition, the applicant states that SCC of the feedwater thermal sleeves or the associated welds is possible but is considered less likely than for other welds with the same weld filler associated with the feedwater sparger since the inconel to carbon steel welds are heat-treated shop welds and are not creviced. Service experience has demonstrated that Alloy 82 is resistant to intergranular stress corrosion cracking (IGSCC) in BWR reactor coolant. Alloy 182 is less resistant to IGSCC than Alloy 82 but has performed acceptably when aggravating factors, such as lack of fusion or a creviced condition, exist. These conditions are more likely in field welds. The Alloy 600-to-carbon steel welds in the thermal sleeve are full penetration welds and do not create a creviced condition. Additionally, the thermal sleeve assembly was heat treated after welding. The #1 end bracket welds use Alloy 182 filler metal in a mildly creviced condition, making them more susceptible to IGSCC than the thermal sleeve-to-sparger welds. Additionally, the #1 welds are exposed to reactor coolant chemistry on the outer diameter which has a higher electrochemical potential (ECP) and, thus, are more likely to cause IGSCC than feedwater, which has a much lower ECP. Therefore, the applicant stated, if cracking is not found in the #1 welds, inspection of the thermal sleeve-to-sparger welds is not necessary.

Furthermore, the applicant states that the most susceptible of the three feedwater sparger end bracket welds (Weld #2) are subject to enhanced VT-1 visual inspection (EVT-1) under BWRVIP. If cracking is found in these welds, the other end bracket welds (#1 and #3) will be inspected. If cracking is found in the less susceptible end bracket welds, the necessity to inspect the thermal sleeve-to-sparger welds will be evaluated. The applicant's BWR Vessel Internals Program will, therefore, be credited with managing cracking of the thermal sleeve since the susceptibility of the critical thermal sleeve weld to IGSCC is bounded by other welds inspected under the applicant's BWR Vessel Internals Program. In a letter dated December 1, 2005, the applicant states that it will revise the NMP ALRA to add an EVT-1 examination of the NMP Unit 1 feedwater sparger brackets as an enhancement to the BWR Vessel Internals Program to address this issue. The project team reviewed the applicant's response and finds it acceptable because the applicant has demonstrated that inspection of surrogate components does bound the NMP Unit 1 feedwater nozzle thermal sleeves.

In a letter dated December 1, 2005, the applicant states that NMP Unit 2 will also use inspections performed under NMP AMP B2.1.8, “BWR Vessel Internals Program,” using surrogate components that are more readily accessible for examination. For NMP Unit 2, the surrogate components will be the feedwater sparger end bracket welds. In this letter, the applicant also provides its basis for choosing the feedwater sparger end bracket welds as follows:

> The applicant noted that a similar evaluation of the NMP Unit 2 feedwater sparger welds and the selection of surrogate welds that are accessible for inspection would also be acceptable for NMP Unit 2. These accessible welds would be used as a leading indicator for potential IGSCC cracking of the thermal sleeve. If cracking is found in these welds, a supplemental evaluation of the thermal sleeve integrity would be required.

The applicant also states that the review of the NMP Unit 2 feedwater thermal sleeve and sparger has been completed. The review has confirmed that the thermal sleeve material is 316L, with several hidden stainless steel welds. The fabrication method review is not complete. The fabrication review will determine the welding procedures, and if the welds were stress relieved. If the hidden welds were stress relieved, the welds would not be considered susceptible to IGSCC and the aging mechanism of cracking would not be considered applicable to NMP Unit 2.

In addition, the applicant stated during the audit and review, that the review of the NMP Unit 2 feedwater sparger installation details identified the field installation applied a 20,000 lbf load creating a 0.125” cold spring to the sparger. The sparger end brackets were pinned, locking in the cold spring, and then final field welded with a fillet weld. The applicant further stated that this installation detail is similar to the NMP Unit 1 installation detail. The result of the cold spring is a fit-up net tensile stress superimposed on the weld residual stress. The combination of the fit-up stress (cold spring) plus the residual stress of the field weld conditions and the fillet weld crevice geometry create a higher susceptibility to IGSCC as compared to the thermal sleeve welds. The reactor water chemistry in the region of the feedwater sparger end bracket welds is equivalent to, if not more aggressive than, the corrosion potential of the reactor water in contact with the outside diameter weld of the thermal sleeve. The applicant also stated that an EVT-1 examination of the NMP Unit 1 and NMP Unit 2 feedwater sparger end bracket welds will be added to its BWR Vessel Internals Program as a program enhancement. The inspection extent and frequency of the end bracket weld inspection will be the same as the ASME Section XI inspection of the feedwater sparger bracket vessel attachment welds. If the final fabrication review of the NMP Unit 2 feedwater thermal sleeve concludes that the hidden welds are not IGSCC susceptible, the NMP Unit 2 inspections will be discontinued.

Furthermore, the applicant stated that the overall conclusion is that the NMP Unit 2 feedwater sparger end bracket welds represent a conservative inspection of the material condition of the hidden thermal sleeve welds with regard to potential IGSCC cracking. Therefore, consistent with the discussion between the project team and the applicant during the audit and review, cracking of the NMP Unit 2 feedwater nozzle thermal sleeves will be managed by the applicant's BWR Feedwater Nozzle Program, BWR Vessel Internals Program, and Water Chemistry Control Program. In a letter dated December 1, 2005, the applicant provides its enhancement. The enhancement states that an EVT-1 examination of the NMP Unit 1 and NMP Unit 2 feedwater sparger end bracket welds will be added to its BWR Vessel Internals Program as a program enhancement. The inspection extent and frequency of the end bracket weld inspection will be the same as the ASME Section XI inspection of the feedwater sparger bracket vessel attachment welds. If the final fabrication review of the NMP Unit 2 feedwater thermal sleeve concludes that the hidden welds are not IGSCC susceptible, the NMP Unit 2 inspections will be discontinued. The project team reviewed the applicant's response and finds it acceptable since the applicant's surrogate weld inspection provides adequate aging management for the NMP Unit 2 feedwater thermal sleeve. On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism for NMP Unit 2 feedwater nozzle thermal sleeves.

In a letter dated December 1, 2005, the applicant also provides operating experience to address the CRDRL nozzle thermal sleeves as follows:

> The inspections of the CRDRL nozzle and safe-ends in 1978 identified IGSCC cracking of the safe-end material, but did not identify fatigue-related cracking. The CRDRL safe-end and the thermal sleeve were replaced in 1978 with design changes to improve resistance to both IGSCC and fatigue. The replacement thermal sleeve material is IGSCC resistant low carbon Type 316L stainless steel material. The thermal sleeve is welded to the safe-end with low carbon Type 308L weld filler. To reduce the probability of fatigue, the thermal sleeve pipe protrudes 7 inches out from the flow shield which promotes mixing away from the vessel wall thus preventing thermal cycling at the vessel wall and at the flow shield.

The applicant also states that as a result of industry operating experience from 2002 and 2003, NMP completed detailed thermal fatigue assessments and augmented inspections of the safe-end, the thermal sleeve attachment weld to the safe-end, and the thermal sleeve weld to the flow shield. These inspections were performed in 2004 and 2005. The inspections to date have identified no IGSCC or thermal fatigue related cracking. Because the 2003 operating experience identified cracking of the thermal shield flow baffle on the thermal shield, additional enhanced visual inspections (EVT-1) of the thermal shield to flow shield weld from the vessel ID are planned for 2007 at a 10 year frequency thereafter consistent with the ISI inspection interval. This EVT-1 examination of the CRDRL thermal sleeve flow shield weld visible from the vessel ID during each ISI interval is consistent with the frequency that has been adopted for the feedwater nozzle surrogate weld location on the feedwater end brackets.

In addition, the applicant states that a one-time UT of the CRDRL safe-end base metal in 2004 was performed under the NMP augmented ISI program, 26 years of operation after the 1978 replacement (three outages prior to the license renewal term). This inspection identified no IGSCC or thermal fatigue cracking of the safe-end location. The inspection was a manual

Performance Demonstration Initiative (PDI) qualified inspection and the PDI mockup included the thermal sleeve attachment weld to the safe-end. The exam records note the presence of the thermal sleeve attachment weld. This exam is considered sufficient to identify if significant circumferential IGSCC cracking of the thermal sleeve exists at the thermal sleeve attachment weld; however, consistent with the surrogate weld inspection methodology being employed for the feedwater nozzle thermal sleeve, the EVT-1 inspection of the thermal sleeve flow shield weld will also be used as a surrogate weld inspection location for the thermal sleeve to safe-end attachment weld.

In addition to the inspections, the applicant states that temperature monitoring for thermal cycling was performed to confirm that the CRD return flow rates were sufficient at NMP Unit 1 to ensure that no unstable thermal cycling due to hot reactor water return flow is occurring at NMP Unit 1. The testing and analyses have established the minimum CRD return flow required to ensure stable return line conditions and confirmed that no reverse flow exists.

The overall conclusion, according to the applicant, is that the safe-end and thermal sleeve replacement with IGSCC-resistant materials and the one time UT of the thermal sleeve attachment weld after 26 years establishes that the thermal sleeve attachment weld is not a high risk IGSCC location. In addition, the thermal monitoring of this location and the inspection after 26 years of operation has also established that no high cycle thermal fatigue conditions exist at this location that could create high thermal cycle fatigue-related cracking concerns.

Furthermore, the applicant continues, that the existing analyses and one time inspections performed in 2004-2005 are adequate to detect potential cracking of the CRDRL nozzle thermal sleeve to safe-end attachment weld from either IGSCC or fatigue. Even though IGSCC is considered a low probability for this location due to the materials of construction, the BWRVIP program will include an enhancement starting in 2007. An EVT-1 inspection of the thermal shield to flow shield weld from the vessel ID will be performed at that time and at a 10 year frequency thereafter consistent with the ISI inspection interval.

The applicant also states that, in addition to identifying the condition of the flow shield weld, this EVT-1 inspection of the thermal sleeve flow shield weld will also be used as a surrogate weld inspection location for the thermal sleeve to the safe-end attachment weld. In a letter dated December 1, 2005, the applicant provides its NMP ALRA revisions as follows:

1. Revise NMP ALRA Sections A1.1.12, A1.4, and B2.1.8 to incorporate the commitment to perform the EVT-1 inspection of the thermal shield to flow shield weld starting in 2007 and proceeding at a 10 year frequency consistent with the ISI inspection interval thereafter.

2. Revise NMP ALRA Table 3.1.1.A-1, Item 3.1.1.A-27 and NMP ALRA Table 3.1.2.A-1 to reflect the changes.

The project team reviewed the applicant’s response and finds it acceptable since the applicant’s surrogate weld inspection, in addition to the results of its one-time inspections performed in 2004 to 2005, provide adequate aging management for the CRDRL thermal sleeve. On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism for NMP Unit 1 CRDRL nozzle thermal sleeves.

2.8.5 Operating Experience

The applicant states, in the NMP ALRA, that it has reviewed both industry and plant-specific operating experience related to its BWR Vessel Internals Program. Review of plant-specific operating experience revealed conditions discovered by the applicant's BWR Vessel Internals Program examinations similar to those identified elsewhere in the BWR fleet. In each case, indications were evaluated and either found acceptable for further service or appropriately repaired. The applicant's BWR Vessel Internals Program is continually adjusted to account for industry experience and research (including activities of the BWR Vessel Internals Program and ASME Section XI Code Committees). In 2001, the Institute of Nuclear Power Operations (INPO) conducted a review of activities related to the applicant's BWR Vessel Internals Program at NMP Unit 2. Several strengths were identified, and recommendations for improvement were addressed by program upgrades at NMP Unit 1 and NMP Unit 2. As additional operating experience is obtained, lessons learned will be used to adjust this program as needed.

The project team reviewed the operating experience provided in the NMP ALRA and the applicant's operating issues related to cracking due to SCC and finds that the current program has proven to be effective in managing the aging of the vessel internals within the scope of license renewal. The following is a sample list of operating experience issues affecting NMP Unit 1 including core shroud cracking, shroud support weld cracking, CRD stub tube IGSCC cracking and leakage, and top guide cracking:

- NMP Unit 1 identified CRD stub tube leakage in 1984. The root cause investigation and inspection confirmed IGSCC cracking of the furnace sensitized 304 CRD stub tubes. NMP implemented a roll repair technique which eliminated the leakage and a structural evaluation of the acceptability of the cracking. NMP Unit 1 is also working through its BWR Vessel Internals Program to obtain approval of an ASME Section XI code case for the roll repair technique for this location.

- NMP Unit 1 identified core shroud horizontal weld cracking following the BWRVIP-01, "BWR Vessel and Internals Project, BWR Core Shroud Inspection and Flaw Evaluation Guideline (Revision 2)" baseline inspection in 1995. The corrective action taken was to install a pre-emptive core shroud tie-rod repair which followed the BWRVIP-02, "BWR Vessel and Internals Project, BWR Core Shroud Repair Design Criteria" shroud repair guidelines. This repair was designed considering a 20-year license renewal term.

- NMP Unit 1 identified core shroud vertical weld cracking in 1997 following a baseline inspection required by BWRVIP-02 guidelines. This inspection justified operations for at least two years prior to the next inspection. A pre-emptive repair was installed in 1999 for the core shroud vertical welds. This repair was designed considering a 20-year license renewal term.

C NMP Unit 1 identified indications in the core shroud support H9 vessel attachment weld during baseline BWRVIP-38, "BWR Shroud Support Inspection and Flaw Evaluation Guidelines" inspections in 2001 (DER-NM-2001-1281). This attachment weld is an Alloy 182 nickel-based alloy with operating experience from an overseas BWR of IGSCC type cracking. The indications were analyzed consistent with BWRVIP-38 methods and judged to remain acceptable considering a 10-year re-inspection frequency. Supplemental inspections on a sampling basis have been performed that have shown the indications are confined to the weld with no propagation into the vessel low-alloy steel. The indications were similar to the indications discussed in GE SIL-624. Other core shroud indications were found in weld H8 (DER-U1-1995-544), weld H3 (DER-U1-1995-807), and weld H6A (DER-U1-1995-880).

C NMP Unit 1 completed a sample baseline inspection of the top guide grid beam which was identified in BWRVIP-26, "BWR Top Guide Inspection and Flaw Evaluation Guidelines" as having the potential for IASCC and as such represented a condition that warranted review when considering the license renewal term (DER-NM-2003-1311). The examination performed on the top guide was based on the recommendations of GE SIL-554. The inspections identified one indication consistent with operating experience identified grid beam cracking at Oyster Creek. The indication was evaluated consistent with BWRVIP-26 methods and found to be acceptable for continued service. Continued inspection and monitoring consistent with BWRVIP-26 requirements is considered acceptable long term based on the current top guide fluence predictions and extent of cracking.

Operating experience issues that have been identified to exist at NMP Unit 2 include core shroud cracking and jet pump wedge wear. The applicant's BWR Vessel Internals Program has not identified other significant cracking of internals covered by its BWR Vessel Internals Program. The BWR Vessel Internals Program recommended actions to inspect the core shroud and internals welds for cracks illustrates the effectiveness of the BWR Vessel Internals Program inspections. For example:

C NMP Unit 2 identified core shroud horizontal weld cracking during the BWRVIP-01 required baseline inspection in 1998. The inspection identified that the core shroud welds H4, H5 and H7 had greater than 30% cracking which warranted plant-specific evaluation. The condition was evaluated consistent with BWRVIP-01 methods and judged to be acceptable for conditioned service without repair. The limiting inspection interval is currently defined at four years for each re-inspection. The condition is currently managed through IGSCC mitigation and re-inspection. Core shroud repair in accordance with BWRVIP-02 is currently considered as a contingency dependent on observed IGSCC crack growth.

- The BWRVIP-41 required baseline inspections are approximately 75% complete with no cracking identified. The baseline inspections identified wedge bearing surface wear contact and set screw gaps, which were inspections recommended by the BWR Vessel Internals Program based on industry operating experience. The inspections identified jet pump wedge wear in the sample population. The required BWRVIP-41 scope expansion was completed and the results showed the wear was isolated to one location. The scope expansion identified set screw gaps one of which warranted a preemptive auxiliary wedge installation to eliminate the gap. The program has identified that corrective measures are needed to prevent flow induced vibration if NMP Unit 2 considers operation above rated core flow.

- NMP Unit 2 identified several cracks in the steam dryer upper support ring side of drain channel 1, 2, and 3 horizontal 304 stainless steel (SS) welds ranging in length from 0.1 inches to 0.7 inches during inspections performed in RFO 6 (DER-NM-1998-1350). A GE evaluation concluded the indications observed are typical of IGSCC. Factors contributing to the initiation of IGSCC (weld residual stresses, weld sensitized 304 stainless steel in the heat affected zone (HAZ), and surface cold work due to fabrication) are all present in the steam dryer upper support ring. The cracking discovered at NMP Unit 2 steam dryer upper support ring is similar to, but less severe than, cracking seen on several similar steam dryers at other plants. The ISI program plan was revised to re-inspect the locations of the cracks to detect any significant increase in the length or number of the indications.

- NMP Unit 2 identified several cracks on the stiffener to upper guide ring welds at various locations between the shroud head bolts during inspections performed in 1998 (DER-NM-1998-1410). A GE evaluation concluded the indications observed are characteristic of IGSCC, which is known to occur in weld sensitized type 304 stainless steel. It was determined no repair was required during the current outage; however, the ISI program plan was revised to re-inspect the locations of the indications to detect any significant increase in the length or number of the indications.

The project team finds that the applicant's BWR Vessel Internals Program recommended actions to inspect the core shroud and internal welds for cracks illustrates the effectiveness of its BWR Vessel Internals Program inspections. The project team also finds that changes and updates to the applicant's BWR Vessel Internals Program have resulted from the ongoing review of industry operating experience and regulatory notices, as these are regularly reviewed for applicability to the reactor vessel internals. In these ways, the applicant addresses vessel internals degradation noted at other BWRs in a systematic manner, and revises its BWR Vessel Internals Program inspections accordingly.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's BWR Vessel Internals Program will adequately manage the aging effects that are identified in the NMP ALRA for which this AMP is credited.

2.8.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the BWR Vessel Internals Program in NMP ALRA, Appendix A, Section A1.1.12 for NMP Unit 1 and Section A2.1.13 for NMP Unit 2, respectively, which state that its BWR Vessel Internals Program manages aging of materials inside the reactor vessel. Program activities include (1) inspections for the presence and effects of cracking; and (2) monitoring and control of water chemistry. This program is based on guidelines issued by the BWR Vessel Internals Program and approved (or pending approval) by the NRC. Inspections and evaluations of reactor vessel components are consistent with the guidelines provided in the applicable BWR Vessel Internals Project reports.

The applicant has completed, or will complete, each of the license renewal applicant action items described in the NRC safety evaluations for these BWR Vessel Internals Program reports. In addition, the applicant will implement the NRC-approved inspection and flaw evaluation guidelines for the steam dryer, access hole cover, and inaccessible core spray, jet pump, and LPCI component welds when issued.

The applicant also provides its UFSAR Supplement for enhancements to its BWR Vessel Internals Program including the following revisions to existing activities that are credited for license renewal:

- The reinspection scope and frequency for the grid beam going forward will be based on BWRVIP-26 guidance for plant-specific flaw analysis and crack growth assessment. The maximum reinspection interval for the grid beam will not exceed 10 years, consistent with standard BWRVIP guidance for the core shroud. The reinspection scope will be equivalent to the UT baseline 2005 inspection scope. In addition, the reinspection scope will include an EVT-1 sample inspection of at least two locations with accessible indications within the initial six years of the 10 year interval. The intent of the EVT-1 is to monitor the known cracking to confirm flaw analysis crack growth assumptions. (Note: This enhancement was revised through a letter dated December 1, 2005).

- The applicant will implement the resolution of the open items documented in BWRVIP-18 regarding the inspection of inaccessible welds for core spray. It will be included in its BWR Vessel Internals Program response to be reviewed and accepted by the NRC. (Note: This enhancement was provided in NMP ALRA).

- Once the guidelines for inspection and evaluation for steam dryers currently under development by the BWR Vessel Internals Program committee are documented, reviewed and accepted by the NRC, the actions will be implemented in accordance with the BWR Vessel Internals Program. (Note: This enhancement was provided in the NMP ALRA).

C The baseline inspections recommended in BWRVIP-47 for the BWR lower plenum components will be incorporated into the program. (Note: This enhancement was provided in the NMP ALRA).

C If the 10/19/05 draft of Code Case N-730 is approved by the ASME, NMP Unit 1 will implement the final code case as conditioned by the NRC. If the code case is not approved by the ASME, NMP Unit 1 will seek NRC approval of the 10/19/05 code case draft on a plant specific basis as conditioned by the NRC.

If during the period of extended operation, a CRD stub tube, rolled in accordance with the provisions of the code case, resumes leaking, NMP will implement one of the following zero leakage permanent repair strategies prior to startup from the outage in which the leakage was detected:

1. A welded repair consistent with BWRVIP-58-A, “BWRVIP Internal access Weld Repair” and Code Case N-606-1, as endorsed by the NRC in Regulatory Guide 1.147.

2. A variation of the welded repair geometry specified in BWRVIP-58-A subject to the approval of the NRC using Code Case N-606-1.

4. A future developed mechanical/welded repair method subject to the approval of the NRC. (Note: This enhancement was revised through the November 30, 2005 letter).

    C Enhance the program to evaluate component susceptibility to loss of fracture toughness. Assessments and Inspections will be performed, as necessary to ensure that intended functions are not impacted by the aging effect. (Note: This enhancement was revised through a letter dated December 1, 2005).

    C An EVT-1 examination of the NMP Unit 1 feedwater sparger end bracket welds will be performed. The inspection extent and frequency of the end bracket weld inspection will be the same as the ASME Section XI inspection of the feedwater sparger bracket vessel attachment welds. (Note: This enhancement was revised through a letter dated December 1, 2005).

    C NMP Unit 1 will perform an EVT-1 inspection of the thermal shield to flow shield weld starting 2007 and proceeding at a 10 year frequency thereafter consistent with the ISI inspection interval. (Note: This enhancement was revised through a letter dated December 1, 2005).

The applicant also provides its USAR Supplement for NMP Unit 2 enhancements to its BWR Vessel Internals Program including the following revisions to existing activities that are credited for license renewal:

- NMP Unit 2 will perform inspections of the guide beams similar (in inspection methods, scope and frequency of inspection) to the inspections specified in BWRVIP-47 for the control rod guide tube components. The extent of examination and its frequency will be based on a ten percent sample of the total population, which includes all grid beam and beam-to-crevice slots, being inspected within 12 years of entry into the period of extended operation with five percent of the population being inspected within the first six years. The sample locations selected for examination will be in areas that are exposed to the highest neutron fluence. The top guide grid beam reinspection requirements will depend on the inspection results; however, at a minimum, the applicant's BWR Vessel Internals Program will follow the same guidance for the subsequent 12 year interval as defined for the initial 12 year baseline. (Note: This enhancement was revised through letters dated December 1, 2005 and December 13, 2005 [MLXXXXXX]).

- The applicant will implement the resolution of the open items documented in BWRVIP-18, BWRVIP-41, and BWRVIP-42 regarding the inspection of inaccessible welds for core spray, jet pump, and LPCI components, respectively. It will be included in its BWR Vessel Internals Program response to be reviewed and accepted by the NRC. (Note: This enhancement was provided in NMP ALRA).

- Once the guidelines for inspection and evaluation for steam dryers currently under development by the BWR Vessel Internals Program committee are documented, reviewed and accepted by the NRC, the actions will be implemented in accordance with the BWR Vessel Internals Program. (Note: This enhancement was provided in NMP ALRA).

- Once the inspection and evaluation guidelines for access hole covers guidelines are documented, reviewed and accepted by the NRC, the actions will be implemented into the BWR Vessel Internals Program. (Note: This enhancement was provided in NMP ALRA).

- The baseline inspections recommended in BWRVIP-47 for the BWR lower plenum components will be incorporated into the program. (Note: This enhancement was provided in NMP ALRA).

- Enhance the program to evaluate component susceptibility to loss of fracture toughness. Assessments and Inspections will be performed, as necessary to ensure that intended functions are not impacted by the aging effect. (Note: This enhancement was revised through a letter dated December 1, 2005).

- An EVT-1 examination of the NMP Unit 2 feedwater sparger end bracket welds will be performed. The inspection extent and frequency of the end bracket weld inspection will be the same as the ASME Section XI inspection of the feedwater sparger bracket vessel attachment welds. If the final fabrication review of the NMP Unit 2 feedwater thermal sleeves concludes that the hidden welds are not IGSCC susceptible, the NMP Unit 2 inspections will be discontinued, as applicable. (Note: This enhancement was revised through a letter dated December 1, 2005).

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.8, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.8.7 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. Also, the project team has reviewed the enhancements and determined that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.9 FLOW-ACCELERATED CORROSION PROGRAM (NMP AMP B2.1.9)

In NMP ALRA, Appendix B, Section B2.1.9, the applicant states that NMP AMP B2.1.9, "Flow-Accelerated Corrosion Program," is an existing plant program that is consistent with GALL AMP XI.M17, "Flow-Accelerated Corrosion."

2.9.1 Program Description

The applicant states, in the NMP ALRA, that this program (also referred to as the Erosion/Corrosion Program at NMP) manages aging effects/mechanisms due to flow-accelerated corrosion in carbon steel and low alloy steel piping containing single-phase and two-phase high-energy fluids. Program activities include (1) analysis using a predictive code (CHECWORKS) to determine critical locations, (2) baseline inspections to determine the extent of thinning at the selected locations, (3) follow-up inspections to confirm the predictions, and (4) repair or replacement of components, as necessary. The inspection results provide input to the predictive computer code to calculate the number of refueling or operating cycles remaining before the component reaches the minimum allowable wall thickness. If the component trend indicates that an area will reach the minimum allowed thickness before the next scheduled outage, the component is repaired, replaced, or re-evaluated. The program considers the information contained in NRC Bulletin 87-01, “Thinning of Pipe Walls in Nuclear Power Plants” and Information Notice 91-18, “High-Energy Piping Failures Caused by Wall Thinning” and implements the guidelines for an effective FAC program presented in EPRI Report NSAC-202L-R2, “Recommendations for an Effective Flow-Accelerated Corrosion Program.” The program also implements the recommendations provided in NRC Generic Letter (GL) 89-08, “Erosion/Corrosion Induced Pipe Wall Thinning.”

2.9.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.9 is consistent with GALL AMP XI.M17.

The project team interviewed the applicant’s technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.9, including the program basis document, “Program Attribute Assessment: Unit 1 Flow Accelerated Corrosion Program and Unit 2 Flow Accelerated Corrosion Program,” which provides an assessment of the AMP elements’ consistency with GALL AMP XI.M17.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.9 and associated basis documents against GALL AMP XI.M17 for consistency.

During the audit and review, the project team asked the applicant to clarify the minimum acceptable wall thickness defined in its Flow-Accelerated Corrosion Program. The applicant states that, its Flow-Accelerated Corrosion Program, the minimum acceptable wall thickness is the thickness required by the design Code to withstand the design loads. The applicant’s Flow-Accelerated Corrosion Program uses 87.5% of the nominal wall thickness as the first threshold for minimum wall thickness because newly purchased pipe to a nominal design specification could have actual wall thickness as low as 87.5% of the nominal wall thickness. The applicant also states that, if degradation is detected such that the measured wall thickness is less than the minimum predicted thickness, it will take additional examinations in adjacent areas and at similar locations in sister trains/parallel lines to bound the thinning and assure that the actual minimum wall is measured. On the basis that the applicant is using an industry accepted 87.5% of the nominal pipe wall thickness which is based on piping manufacturer’s design tolerance for the minimum acceptable wall thickness determination and the applicant is following the recommendations described in EPRI Report NSAC-202L-R2, “Recommendations for an Effective Flow Accelerated Corrosion Program,” for selection of the sampling size, the project team finds this explanation satisfactory.

The project team reviewed those portions of the Flow-Accelerated Corrosion Program for which the applicant claims consistency with GALL AMP XI.M17 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant’s Flow-Accelerated Corrosion Program provides reasonable assurance that it will manage aging effects/mechanisms so that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis through the period of extended operation. The project team finds the applicant’s Flow-Accelerated

Corrosion Program acceptable because it conforms to the recommended GALL XI.M17, “Flow-Accelerated Corrosion.”

2.9.3 Exception to the GALL Report

None

2.9.4 Enhancements

None

2.9.5 Operating Experience

The applicant states, in the NMP ALRA, that wall thinning problems in single- and two-phase systems have occurred throughout the industry, as documented in various NRC Bulletins and Information Notices. The applicant reviewed both industry and plant-specific operating experience in establishing the basis for its Flow-Accelerated Corrosion Program, which is continually adjusted to account for further industry experience and research. As additional operating experience is obtained, lessons learned will be used to adjust this program as needed.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

During the audit and review, the project team asked the applicant how well the CHECKWORKS model predictions compared with the actual field measurements. The applicant informed the project team that the specific software inputs pertaining to the NMP application have been properly verified and tested satisfactorily. While minor changes in wall thickness were detected, the measurements confirmed that, overall, the CHECKWORKS model was conservative. The applicant also states that the model will be continually updated, refined, and calibrated based on the comparison of inspection data with predicted wear rates.

The project team reviewed the applicant’s ECPN-N1-HE-001, “Erosion/Corrosion Program Carbon Steel Piping Review Plan - High Energy Systems.” This procedure lists all NMP Unit 1 SSCs that are inspected in the applicant’s Flow-Accelerated Corrosion Program. The project team noted that plant-specific operating experience has been incorporated into this procedure. The project team also sampled several DERs that resulted from flow-accelerated corrosion inspections (DERs 2002-0796, 2002-1310, 2002-1343, 2002-1344, 2003-1431, 2003-1468, and 2003-1469). The project team noted that these inspection results were properly evaluated, documented, and disposed. The project team also noted that the applicant’s application of the Flow-Accelerated Corrosion Program has resulted in the identification and replacement of susceptible piping sections with materials more resistant to FAC. For example, in 1997, the reheater drain line inlet nozzles to the 5^{th} point feedwater heat exchangers were found to be degrading due to FAC. As a corrective measure, FAC resistence materials were used to replace these piping components (NMP Unit 1 DER 1997-0863/1067); and in 2002, at NMP

Unit 2, a 2nd point feedwater heat exchanger low pressure drain line leaked before its scheduled FAC inspection was performed. The degraded low pressure heater drain lines were replaced with a FAC resistence piping material (chrome-moly). Based on these reviews, the project team concludes that there is reasonable assurance that operating experience will continue to be reviewed in the future to ensure that the effects of aging due to FAC will be adequately managed.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's Flow-Accelerated Corrosion Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.9.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the Flow-Accelerated Corrosion Program in NMP ALRA, Appendix A, Section A1.1.19 for NMP Unit 1 and Section A2.1.19 for NMP Unit 2, respectively, which state that the Flow-Accelerated Corrosion Program manages aging effects/mechanisms due to flow-accelerated corrosion in carbon steel and low alloy steel piping containing single-phase and two-phase high-energy fluids. Program activities include (1) analysis using a predictive code (CHECWORKS) to determine critical locations, (2) baseline inspections to determine the extent of thinning at the selected locations, (3) follow-up inspections to confirm the predictions, and (4) repair or replacement of components, as necessary. The applicant's Flow-Accelerated Corrosion Program considers the recommended actions in NRC Bulletin 87-01 and Information Notice 91-18, and implements the guidelines for an effective Flow-Accelerated Corrosion Program presented in EPRI Report NSAC-202L-R2. The applicant's Flow-Accelerated Corrosion Program also implements the recommendations provided in NRC Generic Letter 89-08.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.9, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.9.7 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR and USAR Supplements for this program, the project team finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.10 OPEN-CYCLE COOLING WATER SYSTEM PROGRAM (NMP AMP B2.1.10)

In NMP ALRA, Appendix B, Section B2.1.10, the applicant states that NMP AMP B2.1.10, "Open-Cycle Cooling Water System Program," is an existing plant program that is consistent with GALL AMP XI.M20, "Open-Cycle Cooling Water System," with enhancements.

2.10.1 Program Description

The applicant states, in the NMP ALRA, that this program manages aging of components exposed to raw, untreated (e.g., service) water. For NMP Unit 1 this includes portions of the service water (SW) system associated with the emergency SW pumps internal components of the reactor building closed loop cooling (RBCLC) heat exchangers; the raw cooling water portions of the emergency diesel generator (DG) and containment spray (CTN-SP) systems portions of the circulating water (CW) system required to support the raw water supply; as well as other components within the scope of license renewal wetted by SW that are credited in the aging management review. The NMP Unit 2 Open-Cycle Cooling Water System Program scope includes a portion of the alternate decay heat (ADH) system with associated portions of the service water (SWP) system, the residual heat removal (RHS) heat exchangers, diesel generator (EGS) jacket water coolers, and control room chillers (HVK).

In addition, the applicant states, in the NMP ALRA, that also included within the program scope are components within the scope of license renewal that are wetted by the SWP system and credited in the aging management review.

Furthermore, the applicant states, in the NMP ALRA, that program activities include (a) surveillance and control of biofouling (including biocide injection), (b) verification of heat transfer capabilities for components cooled by the service water system, (c) inspection and maintenance, (d) walkdown inspections, and (e) review of maintenance, operating and training practices and procedures. Inspections may include visual, UT, and eddy current testing (ECT) methods. The Open-Cycle Cooling Water System Program is based on the recommendations of GL 89-13, "Service Water System Problems Affecting Safety-Related Equipment."

2.10.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.10 is consistent with GALL AMP XI.M20, with enhancements.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.10, including program basis documents, LR-PBD-U1OCCW, "Open-Cycle Cooling Water System (Unit 1)," and LR-PBD-U2OCCW, "Open-Cycle Cooling Water System (Unit 2)," which provide an assessment of the AMP elements' consistency with GALL AMP XI.M20.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.10 and associated basis documents against GALL AMP XI.M20 for consistency.

The project team reviewed those portions of the Open-Cycle Cooling Water System Program for which the applicant claims consistency with GALL AMP XI.M20 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's Open-Cycle Cooling Water System Program provides reasonable assurance that aging effects/mechanisms of loss of material and fouling due to micro- and macro-organisms and various corrosion mechanisms on components within the scope of license renewal in the open-cycle cooling water system, will be managed. The project team finds the applicant's Open-Cycle Cooling Water System Program acceptable because it conforms to the recommended GALL AMP XI.M20, "Open-Cycle Cooling Water System," with the enhancements as described below.

2.10.3 Exceptions to the GALL Report

None

2.10.4 Enhancements

The applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

Element: 1: Scope of Program
Enhancement: Revise applicable existing procedures to ensure that the procedures address the following elements:

- Ensure that the applicable NMP Unit 1 commitments made for GL 89-13, and the recommendations in GALL AMP XI.M20 are captured in the NMP Unit 1 implementing documents for GL 89-13.
(Commitment 14 for NMP Unit 1)

- Ensure that the applicable NMP Unit 2 commitments made for GL 89-13, and the recommendations in GALL AMP XI.M20 are captured in N2-TDP-REL-0104, "GL 89-13, Service Water System Problems Affecting Safety Related Equipment Program Plan."
(Commitment 14 for NMP Unit 2)

- Where the recommendations of GALL AMP XI.M20 are more conservative than the GL 89-13 commitments, they will be incorporated into the Open-Cycle Cooling Water System Program.
(Commitment 14 for NMP Unit 1 and NMP Unit 2)

The GALL Report identifies the following recommendations for the "scope of program" program element associated with the enhancements:

> The program addresses the aging effects/mechanisms of material loss and fouling due to micro- or macro-organisms and various corrosion mechanisms. Because the characteristics of the service water system may be specific to each facility, the OCCW system is defined as a system or systems that transfer heat from safety-related systems, structures, and components (SSC) to the ultimate heat sink (UHS). If an intermediate system is used between the safety-related SSCs and the system rejecting heat to the UHS, that intermediate system performs the function of a service water system and is thus included within the scope of recommendations of NRC GL 89-13. The guidelines of NRC GL 89-13 include (a) surveillance and control of biofouling; (b) a test program to verify heat transfer capabilities; (c) routine inspection and a maintenance program to ensure that corrosion, erosion, protective coating failure, silting, and biofouling cannot degrade the performance of safety-related systems serviced by open-cycle cooling water (OCCW); (d) a system walkdown inspection to ensure compliance with the licensing basis; and (e) a review of maintenance, operating, and training practices and procedures.

The applicant states, in the program basis document, that it is developing an implementing program for both units to integrate the commitments made in accordance with GL 89-13 and the recommendations contained in the GALL Report for GALL AMP XI.M20. In situations for which the GALL Report recommendations are more conservative than the GL 89-13 commitments, the GALL Report recommendations will be incorporated. This enhancement will make the applicant's AMP consistent with the GALL Report and therefore is acceptable. On this basis, the project team finds this enhancement acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

Also in a letter dated November 17, 2005, the applicant revised the NMP ALRA to expand the scope discussion of the program to clarify that it includes internal portions of non-safety related segments of the CW and SW systems which are within the scope of license renewal pursuant to the requirements of 10 CFR 54.4(a)(2) to maintain their pressure integrity. This letter also states that this program manages all aging effects for components subject to the scope of recommendations for GL 89-13. The project team finds this enhancement to be acceptable because it clarifies the overall program scope.

In addition, the applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

Element:	6: Acceptance Criteria
Enhancement:	Revise applicable existing procedures to ensure that the procedures address the following elements:

- Revise the NMP Unit 1 and NMP Unit 2 preventive maintenance and heat transfer performance test procedures to incorporate specific inspection criteria, corrective actions, and frequencies.
  (Commitment 14 for NMP Unit 1 and NMP Unit 2)

The GALL Report identifies the following recommendation for the “acceptance criteria” program element associated with the enhancement:

> Biofouling is removed or reduced as part of the surveillance and control process. The program for managing biofouling and aggressive cooling water environments for OCCW systems is preventive. Acceptance criteria are based on effective cleaning of biological fouling organisms and maintenance of protective coatings or linings are emphasized.

The applicant states, in the program basis documents, that the heat exchanger preventive maintenance procedures will be revised to incorporate inspection criteria and corrective actions which ensure thorough cleaning of all affected OCCW components and initiates appropriate corrective actions if progressive degradation persists, prior to the loss of intended function. This will make the applicant’s AMP consistent with the GALL Report and therefore is acceptable. On this basis, the project team finds this enhancement acceptable as such changes to the applicant’s program will provide additional assurance that the effects of aging will be adequately managed.

2.10.5 Operating Experience

The applicant states, in the NMP ALRA, that inspections implementing the guidance of GL 89-13 have identified deterioration (including pipe wall thinning, pinhole leakage, and microbiologically influenced corrosion) and degradation (including clogged lines, flow restrictions, and fouling). As discussed in the NMP ALRA and the program basis documents, these deficiencies were documented through the NMP corrective action program as DERs and resulted in cleaning, repair, or replacement of the affected components prior to loss of system function. Based on a review of the operating experience information provided in the program basis documents, the guidance of GL 89-13 which has been implemented for over 10 years has been effective in managing the aging effects/mechanisms due to biofouling, corrosion, erosion and silting in components serviced by the OCCW systems.

The project team reviewed the operating experience provided in the NMP ALRA, in the program basis documents, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant’s Open-Cycle Cooling Water System Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.10.6 UFSAR and USAR Supplements

The applicant provides its UFSAR Supplement for the Open-Cycle Cooling Water System Program in NMP ALRA, Appendix A, Section A1.1.29 for NMP Unit 1, which states that the Open-Cycle Cooling Water System Program manages aging of components exposed to raw, untreated (e.g., service) water. This includes portions of the SW system associated with the emergency SW pumps internal components of the RBCLC heat exchangers, the raw cooling water portions of the emergency DG and CTN-SP systems portions of the CW system required to support the raw water supply.

The applicant also states, in the NMP ALRA, that program activities include (a) surveillance and control of biofouling (including biocide injection), (b) verification of heat transfer capabilities for components cooled by the service water system, (c) inspection and maintenance, (d) walkdown inspections, and (e) review of maintenance, operating and training practices and procedures. Inspections may include visual, UT, and ECT methods. This program is based on the recommendations of GL 89-13.

In addition, the applicant states, in the NMP ALRA, that enhancements to its Open-Cycle Cooling Water System Program include the following activities that are credited for license renewal:

- Ensure that the applicable NMP Unit 1 commitments made for GL 89-13, and the recommendations in GALL AMP XI.M20 are captured in the NMP Unit 1 implementing documents for GL 89-13.

- Where the recommendations of GALL AMP XI.M20 are more conservative than the GL 89-13 commitments, they will be incorporated into the Open-Cycle Cooling Water System Program.

- Revise NMP Unit 1 preventive maintenance and heat transfer performance test procedures to incorporate specific inspection criteria, corrective actions, and frequencies.

In addition, the applicant provides its USAR Supplement for the Open-Cycle Cooling Water System Program in NMP ALRA, Appendix A, Section A2.1.29 for NMP Unit 2, which states that the Open-Cycle Cooling Water System Program manages aging of components exposed to raw, untreated (e.g., service) water. This includes a portion of the ADH system associated portions of the service water (SWP) system, the RHS heat exchangers, diesel generator (EGS) jacket water coolers, and control room chillers (HVK). Also included are components within the scope of license renewal that are wetted by the SW system and credited in the aging management review. Program activities include (a) surveillance and control of biofouling (including biocide injection), (b) verification of heat transfer capabilities for components cooled by the service water system, (c) inspection and maintenance, (d) walkdown inspections, and (e) review of maintenance, operating and training practices and procedures. Inspections may include visual, UT, and ECT methods. This program is based on the recommendations of GL 89-13.

The applicant also states, in the NMP ALRA, that enhancements to its Open-Cycle Cooling Water System Program include the following activities that are credited for license renewal:

- Ensure that the applicable NMP Unit 2 commitments made for GL 89-13, and the recommendations in GALL AMP XI.M20 are captured in N2-TDP-REL-0104, “GL 89-13, Service Water System Problems Affecting Safety Related Equipment Program Plan.”

- Where the recommendations of GALL AMP XI.M20 are more conservative than the GL 89-13 commitments, they will be incorporated into the Open-Cycle Cooling Water System Program.

- Revise NMP Unit 2 preventive maintenance and heat transfer performance test procedures to incorporate specific inspection criteria, corrective actions, and frequencies.

Furthermore, the applicant states, in the NMP ALRA, that the enhancements for both NMP Unit 1 and Unit 2 will be completed prior to the period of extended operation.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.10, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.10.7 Conclusion

On the basis of its review and audit of the applicant’s program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. Also, the project team has reviewed the enhancements and determined that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.11 CLOSED-CYCLE COOLING WATER SYSTEM PROGRAM (NMP AMP B2.1.11)

In NMP ALRA, Appendix B, Section B2.1.11, the applicant states that NMP AMP B2.1.11 “Closed-Cycle Cooling Water System Program,” is an existing plant program that is consistent with GALL AMP XI.M21, “Closed-Cycle Cooling Water System,” with enhancements.

2.11.1 Program Description

The applicant states, in the NMP ALRA, that this program manages loss of material and fouling of components exposed to closed-cycle cooling water (CCCW) environments. The applicable piping systems at NMP include the NMP Unit 1 and NMP Unit 2 reactor building closed loop cooling systems, NMP Unit 1 control room HVAC system, the NMP Unit 2 control building ventilation chilled water system, the heat exchanger jacket water cooling portions of the NMP Unit 1 emergency diesel generator system and the NMP Unit 2 standby diesel generator protection (generator) system. Program activities include chemistry monitoring, surveillance testing, data trending, and component inspections. The Closed-Cycle Cooling Water System Program implements the guidelines for controlling system performance and aging effects/mechanisms described in EPRI Report TR-107396, “Closed Cooling Water Chemistry Guidelines.”

2.11.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.11 is consistent with GALL AMP XI.M21, with enhancements.

The project team interviewed the applicant’s technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.11, including NMP program basis documents, LR-PBD-U1CCCW, “Closed-Cycle Cooling Water System (Unit 1),” and LR-PBD-U2CCCW, “Closed-Cycle Cooling Water System (Unit 2),” which provide an assessment of the AMP elements’ consistency with GALL AMP XI.M21.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.11 and associated basis documents against GALL AMP XI.M21 for consistency.

The project team reviewed those portions of the Closed-Cycle Cooling Water System Program for which the applicant claims consistency with GALL AMP XI.M21 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant’s Closed-Cycle Cooling Water System Program provides reasonable assurance that the aging effects/mechanisms of loss of material and fouling of components exposed to closed-cycle cooling water environments will be managed. The project team finds the applicant’s Closed-Cycle Cooling Water System Program acceptable because it conforms to the recommended GALL AMP XI.M21, “Closed-Cycle Cooling Water System,” with the enhancements as described below.

2.11.3 Exceptions to the GALL Report

None

2.11.4 Enhancements

The applicant states, in the NMP ALRA, that the enhancements in meeting the GALL Report program element are as follows:

Element: 2: Preventive Actions
Enhancements: Revise applicable existing procedures to ensure that the procedures address the following:

- Expand periodic chemistry checks of CCCW systems consistent with the guidelines of EPRI TR-107396.

- Implement a program to use corrosion inhibitors in the NMP Unit 1 and NMP Unit 2 reactor building closed loop cooling systems, NMP Unit 1 control room HVAC system. (Commitment 15 for NMP Unit 1 and NMP Unit 2)

The GALL Report identifies the following recommendation for the "preventive actions" program element associated with the enhancements:

> The program relies on the use of appropriate materials, lining, or coating to protect the underlying metal surfaces and maintenance of system corrosion inhibitor concentrations within specified limits of EPRI TR-107396 to minimize corrosion. The program includes monitoring and control of cooling water chemistry to minimize exposure to aggressive environments and application of corrosion inhibitor in the CCCW system to mitigate general, crevice, and pitting corrosion.

The applicant states, in the NMP ALRA, that it is expanding the chemistry parameters addressed for the closed-cycle cooling water systems to be consistent with the guidelines of EPRI TR-107396. The project team finds this enhancement acceptable because it will make the applicant's AMP consistent with the GALL Report. Furthermore, the applicant states, in the NMP ALRA, that it will develop an enhancement to implement the use of corrosion inhibitors in the NMP Unit 1 and Unit 2 reactor building closed loop cooling system, NMP Unit 1 control room HVAC system, and NMP Unit 2 control building ventilation chilled water system in accordance with the guidelines given in EPRI TR-107396. The project team finds this acceptable because it will make the applicant's AMP consistent with the GALL Report.

During the audit and review, the project team asked the applicant to clarify if the chromate corrosion inhibitor which is used in the NMP Unit 1 diesel generator jacket cooling water is consistent with the guidelines provided in EPRI TR-107396. The applicant responded that the chromate concentrations are outside the range of values provided in this document. The project team asked the applicant to justify the use of a corrosion inhibitor concentration outside of the range recommended in EPRI Report TR-107396.

In a letter dated December 1, 2005, the applicant states that the chromate concentration is above the EPRI recommended control limit, but that it is consistent with vendor recommendations. In this letter, the applicant further states that the lower concentration limit in the EPRI document was based on the potential impact that the higher concentration corrosion inhibitor could have on the life of mechanical seals. The applicant further states that it reviewed the maintenance history of mechanical seals at NMP Unit 1 and found no occurrence of catastrophic failure. In order to manage the impact of the higher concentration corrosion inhibitor on the mechanical seal life, the applicant states in this letter, that it will establish a required seal replacement frequency of 10 years maximum in lieu of the recommended replacement frequency of every 12 years. Based on the satisfactory operation with the vendor recommended chromate corrosion inhibitor concentration and the establishment of a program to replace the mechanical seals before the projected replacement frequency, the project team finds this enhancement acceptable.

For NMP Unit 2, the applicant is using a nitrite corrosion inhibitor in the EGS jacket water cooling water. During the audit and review, the project team asked the applicant to clarify whether the nitrite corrosion inhibitor, which is used in the NMP Unit 2 EGS jacket cooling water, is consistent with the guidelines provided in EPRI TR-107396. The applicant states that the nitrite concentrations are within the range of values provided in this document. The project team finds this acceptable because it is consistent with the chemistry basis document recommended in the GALL Report.

In addition, the applicant states, in the NMP ALRA, that the enhancements in meeting the GALL Report program elements are as follows:

Elements:	3: Parameters Monitored/Inspected 4: Detection of Aging Effects
Enhancements:	Revise applicable existing procedures to ensure that the procedures address the following:

- Direct periodic inspections to monitor for loss of material in the piping of the CCCW systems.
  (Commitment 15 for NMP Unit 1 and NMP Unit 2)

- Implement a corrosion monitoring program for larger bore CCCW piping not subject to inspection under another program at NMP Unit 1.
  (Commitment 15 for NMP Unit 1)

The GALL Report identifies the following recommendation for the “parameters monitored/inspected” program element associated with the enhancements:

> The aging management program monitors the effects of corrosion by surveillance testing and inspection in accordance with standards in EPRI TR-107396 to evaluate system and component performance. For pumps, the parameters monitored include flow and discharge and suction pressures. For heat exchangers, the parameters monitored include flow, inlet and outlet temperatures, and differential pressure.

The project team reviewed these enhancements and finds them to be consistent with the GALL Report and therefore acceptable. On this basis, the project team finds these enhancements acceptable as such changes to the applicant’s program will provide additional assurance that the effects of aging will be adequately managed.

The GALL Report identifies the following recommendation for the “detection of aging effects” program element associated with the enhancements:

> Control of water chemistry does not preclude corrosion at locations of stagnant flow conditions or crevices. Degradation of a component due to corrosion would result in degradation of system or component performance. The extent and schedule of inspections and testing in accordance with EPRI TR-107396, assure detection of corrosion before the loss of intended function of the component. Performance and functional testing in accordance with EPRI TR-107396, ensures acceptable functioning of the CCCW system or components serviced by the CCCW system. For systems and components in continuous operation, performance adequacy is determined by monitoring data trends for evaluation of heat transfer fouling, pump wear characteristics, and branch flow changes. Components not in operation are periodically tested to ensure operability.

The applicant, states in the program basis document, that by expanding the existing corrosion monitoring program for small bore CCCW piping to include larger bore (greater than 3-inch outer diameter) it is making the NMP Closed-Cycle Cooling Water System Program consistent with the GALL Report. Based on the review of this enhancement, the project team finds this enhancement to be consistent with the GALL Report and therefore acceptable. On this basis, the project team finds this enhancement acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

In addition, the applicant states, in the NMP ALRA, that the enhancements in meeting the GALL Report program element are as follows:

Element: 5: Monitoring and Trending
Enhancements: Revise applicable existing procedures to ensure that the procedures address the following:

C Establish the frequencies to inspect for degradation of components in CCCW systems, including heat exchanger tube wall thinning.
(Commitment 15 for NMP Unit 1 and NMP Unit 2)

C Perform a heat removal capability test for the NMP Unit 1 control room HVAC system at least every five years.
(Commitment 15 for NMP Unit 1)

C Establish periodic monitoring, trending, and evaluation of performance parameters for the NMP Unit 1 and NMP Unit 2 reactor building closed loop cooling, NMP Unit 1 control room HVAC, and NMP Unit 2 control building ventilation chilled water systems.
(Commitment 15 for NMP Unit 1 and NMP Unit 2)

C Specify chemistry sampling frequency for the NMP Unit 2 control building ventilation chilled water system.
(Commitment 15 for NMP Unit 2)

The GALL Report identifies the following recommendation for the “monitoring and trending” program element associated with the enhancements:

> The frequency of sampling water chemistry varies and can occur on a continuous, daily, weekly, or as needed basis, as indicated by plant operating conditions. Per EPRI TR-107396, performance and functional tests are performed at least every 18 months to demonstrate system operability, and tests to evaluate heat removal capability of the system and degradation of system components are performed every five years. The testing intervals may be adjusted on the basis of the results of the reliability analysis, type of service, frequency of operation, or age of components and systems.

The project team reviewed the enhancements described above and finds them to be consistent with the GALL Report and therefore acceptable. On this basis, the project team finds these enhancements acceptable as such changes to the applicant’s program will provide additional assurance that the effects of aging will be adequately managed.

In addition, the applicant states, in the NMP ALRA, that the enhancements in meeting the GALL Report program element are as follows:

Element: 6: Acceptance Criteria
Enhancements: Revise applicable existing procedures to ensure that the procedures address the following:

- Provide the controls and sampling necessary to maintain water chemistry parameters in CCCW systems within the guidelines of EPRI Report TR-107396.
(Commitment 15 for NMP Unit 1 and NMP Unit 2)

- Ensure acceptance criteria are specified in the implementing procedures for the applicable indications of degradation.
(Commitment 15 for NMP Unit 1 and NMP Unit 2)

The GALL Report identifies the following recommendation for the “acceptance criteria” program element associated with the enhancements:

> Corrosion inhibitor concentrations are maintained within the limits specified in the EPRI water chemistry guidelines for CCCW. System and component performance test results are evaluated in accordance with the guidelines of EPRI TR-107396. Acceptance criteria and tolerances are also based on system design parameters and functions.

The project team reviewed these enhancements described above and finds them to be consistent with the GALL Report and therefore acceptable. On this basis, the project team finds these enhancements acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

The applicant states, in the NMP ALRA, that these enhancements are scheduled for completion prior to the period of extended operation.

2.11.5 Operating Experience

The applicant states, in the NMP ALRA, that a review of plant-specific operating experience revealed various forms of degradation that were discovered by Closed-Cycle Cooling Water System Program activities at NMP. The applicant also states that corrective actions for observed degradation included increased monitoring, component repair, or component replacement as deemed necessary. In addition, the applicant states, that periodic monitoring of closed-cycle cooling water systems assures that any worsening trends are identified and the capabilities of the closed-cycle cooling water system within the scope of license renewal are maintained. Finally, the applicant states, in the NMP ALRA, that its Closed-Cycle Cooling Water System Program is continually adjusted to account for industry experience and research. In the NMP ALRA, the applicant states that as additional operating experience is obtained, lessons learned will be used to adjust this program as needed.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's Closed-Cycle Cooling Water System Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.11.6 UFSAR and USAR Supplements

The applicant provides its UFSAR Supplement for the Closed-Cycle Cooling Water System Program in NMP ALRA, Appendix A, Section A1.1.13 for NMP Unit 1, which states that the Closed-Cycle Cooling Water System Program manages loss of material and fouling of components exposed to closed-cycle cooling water environments. The applicable piping systems include the reactor building closed loop cooling system, control room HVAC system, the heat exchanger jacket water cooling portions of the emergency diesel generator system. Also included are portions of non-safety related systems credited in the aging management review. Program activities include chemistry monitoring, surveillance testing, data trending, and component inspections. The applicant's Closed-Cycle Cooling Water System Program implements the guidelines for controlling system performance and aging effects/mechanisms described in EPRI Report TR-107396.

The applicant also states, in the NMP ALRA, that enhancements to its Closed-Cycle Cooling Water System Program for NMP Unit 1 include the following revisions to existing activities that are credited for license renewal:

- Direct periodic inspections to monitor for loss of material in the piping of the CCCW systems.

- Implement a corrosion monitoring program for larger bore CCCW piping not subject to inspection under another program.

- Establish periodic monitoring, trending, and evaluation of performance parameters for the reactor building closed loop cooling and control room HVAC systems.

- Implement a program to use corrosion inhibitors in the reactor building closed loop cooling system and control room HVAC system in accordance with the guidelines given in EPRI TR-107396.

- Establish the frequencies to inspect for degradation of components in CCCW systems, including heat exchanger tube wall thinning.

- Perform a heat removal capability test for the control room HVAC system at least every five years.

- Expand periodic chemistry checks of CCCW systems consistent with the guidelines of EPRI TR-107396.

- Provide the controls and sampling necessary to maintain water chemistry parameters in CCCW systems within the guidelines of EPRI Report TR-107396.

- Ensure acceptance criteria are specified in the implementing procedures for the applicable indications of degradation.

In addition, the applicant provides its USAR Supplement for the Closed-Cycle Cooling Water System Program for Unit 2 in NMP ALRA, Appendix A, Section A2.1.14, which states that the Closed-Cycle Cooling Water System Program manages loss of material and fouling of components exposed to closed-cycle cooling water environments. The applicable piping systems include the reactor building closed loop cooling system which does not perform an intended cooling function, control building ventilation chilled water system, the heat exchanger jacket water cooling portion of the standby diesel generator protection (generator) system. Also included are portions of non-safety related systems credited in the aging management review. Program activities include chemistry monitoring, surveillance testing, data trending, and component inspections. The applicant’s Closed-Cycle Cooling Water System Program implements the guidelines for controlling system performance and aging effects/mechanisms described in EPRI Report TR-107396.

The applicant also states, in the NMP ALRA, that enhancements to its Closed-Cycle Cooling Water System Program include the following revisions to existing activities that are credited for license renewal:

- Direct periodic inspections to monitor for loss of material in the piping of the CCCW systems.

- Establish periodic monitoring, trending, and evaluation of performance parameters for the reactor building closed loop cooling and control building ventilation chilled water systems.

- Implement a program to use corrosion inhibitors in the reactor building closed loop cooling system and control building ventilation chilled water system in accordance with the guidelines given in EPRI TR-107396.

- Establish the frequencies to inspect for degradation of components in CCCW systems, including heat exchanger tube wall thinning.

- Expand periodic chemistry checks of CCCW systems consistent with the guidelines of EPRI TR-107396.

- Specify chemistry sampling frequency for the control building ventilation chilled water system.

- Provide the controls and sampling necessary to maintain water chemistry parameters in CCCW systems within the guidelines of EPRI Report TR-107396.

- Ensure acceptance criteria are specified in the implementing procedures for the applicable indications of degradation.

Furthermore, the applicant states, in the NMP ALRA, that the enhancements for both NMP Unit 1 and Unit 2 will be completed prior to the period of extended operation.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.11, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.11.7 Conclusion

On the basis of its review and audit of the applicant’s program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. Also, the project team has reviewed the enhancements and determined that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.12 BORAFLEX MONITORING PROGRAM (NMP UNIT 1 ONLY) (NMP AMP B2.1.12)

In NMP ALRA, Appendix B, Section B2.1.12, the applicant states that NMP AMP B2.1.12, "Boraflex Monitoring Program (NMP Unit 1 Only)," is an existing plant program that is consistent with GALL AMP XI.22, "Boraflex Monitoring Program," with an enhancement.

2.12.1 Program Description

The applicant states, in the NMP ALRA, that this program manages degradation of neutron absorbing material in spent fuel pool storage racks resulting from radiation exposure and possible water ingress. Program activities include (1) inspection of the NMP Unit 1 test coupons to detect dimensional changes; (2) correlation of measured levels of silica in the spent fuel pool with analysis using a predictive code (e.g., RACKLIFE) to estimate boron loss from Boraflex panels; and (3) neutron attenuation testing to measure the boron areal density of the short-length test coupons. The applicant's Boraflex Monitoring Program for NMP Unit 1 will be enhanced to require periodic in-situ neutron attenuation testing and measurement of boron areal density to confirm the correlation of the conditions of test coupons to those of Boraflex racks that remain in use during the period of extended operation. This enhancement will be implemented prior to the period of extended operation.

The applicant also states that its Boraflex Monitoring Program is only applicable to NMP Unit 1, since prior to the period of extended operation, the Boraflex panels in NMP Unit 2 spent fuel pool will be replaced with Boral panels (Commitment 36 for NMP Unit 2).

2.12.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.12 is consistent with GALL AMP XI.M22, with an enhancement.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.12, including program basis document, LR-PBD-BORAFLEX, "Boraflex Monitoring (Unit 1 only)," which provides an assessment of the AMP elements' consistency with GALL AMP XI.M22.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.12 and associated basis documents against GALL AMP XI.M22 for consistency.

The project team reviewed those portions of the Boraflex Monitoring Program (NMP Unit 1 Only) for which the applicant claims consistency with GALL AMP XI.M22 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's Boraflex Monitoring Program (NMP Unit 1 Only) provides reasonable assurance that the degradation of neutron absorbing material in spent fuel pool storage racks resulting from radiation exposure and possible water ingress is adequately managed. The project team finds the applicant's Boraflex Monitoring Program (NMP Unit 1 Only) acceptable because it conforms to the recommended GALL AMP XI.M22, “Boraflex Monitoring Program,” with the enhancement as described below.

2.12.3 Exceptions to the GALL Report

None

2.12.4 Enhancements

The applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program elements is as follows:

Elements:	2: Preventive Actions 3: Parameters Monitored/Inspected 4: Detection of Aging Effects
Enhancement:	To include performance of periodic neutron attenuation testing and measurement of boron areal density to confirm the correlation of the conditions of the test coupons to the conditions of the Boraflex racks that remain in use during the period of extended operation. (Commitment 16 for NMP Unit 1)

The GALL Report identifies the following recommendations for the program elements associated with the enhancement:

> Preventive Actions: For Boraflex panels, monitoring silica levels in the storage pool water, measuring gap formation by blackness testing, periodically measuring boron areal density, and applying predictive codes, are performed.
>
> Parameters Monitored/Inspected: The parameters monitored include physical conditions of the Boraflex panels, such as gap formation and decreased boron areal density, and the concentration of the silica in the spent fuel pool.
>
> Detection of Aging Effects: The amount of boron carbide released from the Boraflex panel is determined through direct measurement of boron areal density and correlated with the levels of silica present through the use of a predictive code. This is supplemented with detection of gaps through blackness testing and periodic verification of boron loss through areal density measurement techniques such as the BADGER device.

The applicant states, in the NMP ALRA, that it originally planned to rely mainly on the test coupons, which consist of both short and full-length versions, to monitor the Boraflex panel condition. During the initial audit and review (August 9 through August 13, 2004), the project team expressed concerns that there is no plan to perform periodic boron areal density testing in light of the current NMP Boraflex panel conditions. To address the project team’s concern, the applicant revised its plan, and in the NMP ALRA, the applicant states that it will provide direction for periodic performance of neutron attenuation testing and measurement of boron areal density to confirm the correlation of the conditions of the test coupons to the conditions of the Boraflex racks that remain in use during the period of extended operation. On this basis, the project team finds this enhancement acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

2.12.5 Operating Experience

The applicant states, in the NMP ALRA, that both industry and plant-specific operating experience with Boraflex were reviewed for NMP. During the audit and review, the project team noted that the applicant addressed the industry operating experience, as documented in IN 87-43, "Gaps in Neutron Absorbing Material in High Density Spent Fuel Storage Racks," IN 93-70, "Degradation of Boraflex Neutron Absorber Coupons, and IN 95-38, "Degradation of Boraflex Neutron Absorber in Spent Fuel Storage Racks" through the its response to GL 96-04, "Boraflex Degradation in Spent Fuel Pool Storage Racks." The applicant also indicates that industry experience documented in EPRI NP-6159, "An Assessment of Boraflex Performance in Spent Nuclear Fuel Storage Racks," EPRI TR-101986, "Boraflex Test Results and Evaluation," and EPRI TR-103300, "Guidelines for Boraflex Use in Spent-Fuel Storage Racks," was considered in the development of its Boraflex Monitoring Program. While the historical trend in silica concentration in the NMP spent fuel pool confirms that acknowledged degradation at a predicted rate is occurring at both NMP Unit 1 and Unit 2, to date, no unpredicted excursion in the rate of increase in silica levels has been observed. Through discussions with the applicant's technical staff and sampling examinations of the DER list that was associated with the applicant's Boraflex Monitoring Program, the project team concluded that the applicant is effective in incorporating the operating experience into its operations.

The project team noted that the applicant is actively managing the current Boraflex rack conditions. In NMP Unit 1, the applicant is in the process of replacing six of the eight Boraflex racks with racks made of Boral. Those Boraflex racks which will remain in the spent fuel pool will be used only in low flux areas and will not be in the vicinity of freshly discharged fuel. In NMP Unit 2, the applicant plans to replace all Boraflex panels with Boral panels, prior to period of extended operation.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the Boraflex Monitoring Program (NMP Unit 1 Only) will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.12.6 UFSAR Supplement

The applicant provides its UFSAR Supplement for the Boraflex Monitoring Program (NMP Unit 1 Only) in NMP ALRA, Appendix A, Section A1.1.5, which states that the Boraflex

Monitoring Program is an existing program that manages degradation of neutron absorbing material in spent fuel pool storage racks resulting from radiation exposure and possible water ingress. Program activities include (1) inspection of the test coupons to detect dimensional changes; (2) correlation of measured levels of silica in the spent fuel pool with analysis using a predictive code (e.g., RACKLIFE) to estimate boron loss from Boraflex panels; and (3) neutron attenuation testing to measure the boron areal density of the short-length test coupons. The applicant's Boraflex Monitoring Program is based on existing technology and methods for testing and evaluating material properties necessary to ensure the required 5% margin to criticality in the spent fuel pool is maintained. The applicant's Boraflex Monitoring Program for NMP Unit 1 will be enhanced to perform periodic in-situ neutron attenuation testing and measurement of boron areal density for those Boraflex racks that remain in use during the period of extended operation.

The applicant also states, in the NMP ALRA, that these enhancements will be completed prior to the period of extended operation.

The project team reviewed the UFSAR Supplement for NMP AMP B2.1.12, found that it was consistent with the GALL Report, and determined that it provides an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.12.7 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. Also, the project team has reviewed the enhancement and determined that the implementation of the enhancement prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR Supplement for this AMP, and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.13 INSPECTION OF OVERHEAD HEAVY LOAD AND LIGHT LOAD HANDLING SYSTEMS PROGRAM (NMP AMP B2.1.13)

In NMP ALRA, Appendix B, Section, B2.1.13, the applicant states that NMP AMP B2.1.13, "Inspection of Overhead Heavy Load and Light Load Handling Systems Program," is an existing plant program that is consistent with GALL AMP XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems," with an enhancement.

2.13.1 Program Description

The applicant states, in NMP ALRA, that this program manages loss of material of structural components due to corrosion for the cranes within the scope of license renewal. The program activities include performance of various maintenance activities on a specified frequency and pre-operational inspections of crane equipment prior to lifting activities. The applicant states in its program basis document, LR-PBD-OHLOAD, “Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (Units 1 and 2),” that the crane inspection program at NMP is implemented through existing plant maintenance procedures. Cranes are inspected in accordance with the maintenance rule requirements provided in 10 CFR 50.65, “Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” and the guidance provided in Nuclear Regulatory Commission Regulatory Guide 1.160, “Monitoring the Effectiveness of Maintenance at Nuclear Power Plants.” The applicant states these activities are adequate to ensure that loss of material is discovered and, if evident, the extent and impact is evaluated before there is a loss of intended function.

2.13.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.13 is consistent with GALL AMP XI.M23, with enhancements.

The project team interviewed the applicant’s technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.13, including program basis document, LR-PBD-OHLOAD, “Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (Units 1 and 2),” which provides an assessment of the AMP elements’ consistency with GALL AMP XI.M23.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.13 and associated basis documents against GALL AMP XI.M23 for consistency.

During the initial audit and review (August 9 through August 13, 2004), the applicant stated, in the since superseded program attribute assessment document, “Units 1 and 2 Inspection of Overhead Heavy Load and Light Load Handling Systems Program,” under the GALL Report program element “parameters monitored/inspected” comparison that “the program ensures that crane operation is within the design limits in regards to the number and magnitude of lifts.” The project team asked the applicant, during the initial audit and review, to explain how the number and magnitude of lifts for each crane within the scope of license renewal have been historically documented and will be documented in the future under a renewed license. The applicant was also asked to explain how the responsible individual or individuals for ensuring that crane operations are within the crane design limits in regards to the number and magnitude of lifts for license renewal cranes track and how it maintains this information on a daily or outage basis.

During the initial audit and review, the applicant stated, that in response to the project team’s questions, the statement in the program attribute assessment document that the program ensures crane operation is within the design limits in regards to the number and magnitude of lifts is a qualitative review and not a quantitative review. The applicant states in the superseded program attribute assessment document, that the cranes at NMP, within the scope of license renewal, are designed as standby or infrequent service cranes, as are most cranes in similar applications. Crane capacity loads may be handled for initial installation of equipment and for infrequent maintenance. This is the lightest crane use (Class A) as far as duty cycle is concerned in accordance with the Crane Manufacturers Association of America (CMAA) crane service classifications. Due to the infrequent use of the cranes below their rated capacity, it is concluded by the applicant that by industry experience and engineering judgement that this meets the intent of GALL AMP XI.M23 for reviewing the number and magnitude of lifts and that a documented history is not required. The project team finds that the applicant maintains this same philosophy with respect to this GALL AMP XI.M23 program element in the NMP ALRA and new program basis document that superseded the program attribute assessment document.

The project team finds this explanation acceptable since the cranes within the scope of license renewal are infrequently used. A qualitative review of the number and magnitude of lifts made by a crane is reasonable since the recording of the number and magnitude of every crane lift would be an excessive documentation burden for cranes where their utilization is well below their design life.

The project team reviewed those portions of the Inspection of Overhead Heavy Load and Light Load Handling Systems Program for which the applicant claims consistency with GALL AMP XI.M23 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's Inspection of Overhead Heavy Load and Light Load Handling Systems Program provides reasonable assurance that aging management of loss of material due to corrosion for structural components of the cranes within the scope of license renewal, will be performed. The project team finds the applicant's Inspection of Overhead Heavy Load and Light Load Handling Systems Program acceptable because it conforms to the recommended GALL AMP XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems Program," with the enhancement as described below.

2.13.3 Exceptions to the GALL Report

None

2.13.4 Enhancements

The applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program elements is as follows:

Elements:	3: Parameters Monitored/Inspected 4: Detection of Aging Effects
Enhancement:	The applicant states that various cranes and hoists are not currently inspected for loss of material of the load bearing components; therefore, an enhancement to the corresponding preventive maintenance procedure will be made to perform a visual inspection for loss of material of the hoist lifting assembly components. (Commitment 17 for NMP Unit 1 and Commitment 16 for NMP Unit 2)

The GALL Report identifies the following recommendations for the program elements associated with the enhancement:

> Parameters Monitored/Inspected: The program evaluates the effectiveness of the maintenance monitoring program and the effects of past and future usage on the structural reliability of cranes. The number of lifts made by the crane are also reviewed.
>
> Detection of Aging Effects: Crane rails and structural components are visually inspected on a routine basis for degradation. Functional tests are also performed to assure their integrity.

The applicant states, in its program basis document, that each crane determined to be within the scope of license renewal has a procedure which periodically performs an inspection of the crane. This inspection however, does not specifically instruct for inspection of components for loss of material and corrosion. Also, the procedures do not specifically identify the effects of wear on the rails in the respective rail system (as applicable). Procedures will be enhanced to add a step that directs visual inspection for loss of material from corrosion and wear on the rails in the respective rail system.

In addition, the applicant states, in its program basis document, that this enhancement will add specific inspection steps for general corrosion to the preventive maintenance procedures for each crane determined to be within the scope of license renewal. Adding visual inspections to the procedures will be adequate to ensure that loss of material is detected before there is a loss of intended function. With these additional inspections, the applicant's Inspection of Overhead Heavy Load and Light Load Handling Systems Program will meet the intent of the program described in GALL AMP XI.M23. The applicant has identified commitments to the NRC associated with this enhancement relative to GALL AMP XI.M23. On this basis, the project team finds this enhancement acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

2.13.5 Operating Experience

The applicant states, in the NMP ALRA, that it has reviewed both industry and plant-specific operating experience relating to the Inspection of Overhead Heavy Load and Light Load Handling Systems Program. Review of plant-specific operating experience revealed no failures caused by loss of material in crane structural components. The applicant's Inspection of Overhead Heavy Load and Light Load Handling Systems Program is continually adjusted to account for industry experience and research. As additional operating experience is obtained, lessons learned will be used to adjust this program as needed.

The project team also reviewed the summary of specific operating experience provided in the applicant's program basis document. The review indicated the Inspection of Overhead Heavy Load and Light Load Handling Systems Program is effective in identifying crane degradation and implementing repairs. A review of NMP plant corrective action records revealed that there have been no failures from loss of material of structural components for cranes. Any deficiencies associated with NMP cranes have been attributed to design flaws, installation deficiencies, adjustments, or improper maintenance procedures. None of these deficiencies resulted in loss of intended function due to age related degradation. This provides assurance that loss of material of crane and trolley structural components has not been occurring since the inception of the program. After enhancement, the program procedures will be more effective in discovering age-related degradation, implementing repairs, and maintaining the integrity of NMP load handling systems within the scope of license renewal to ensure that loss of material is discovered and, if evident, the extent and impact is evaluated before there is a loss of intended function.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's Inspection of Overhead Heavy Load and Light Load Handling Systems Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.13.6 UFSAR and USAR Supplements

The applicant provided its UFSAR and USAR Supplements for the Inspection of Overhead Heavy Load and Light Load Handling Systems Program in NMP ALRA, Appendix A, Section A1.1.22 for NMP Unit 1 and Section A2.1.22 for NMP Unit 2, respectively, which state that its Inspection of Overhead Heavy Load and Light Load Handling Systems Program manages loss of material due to corrosion of cranes within the scope of license renewal. Program activities include (1) performance of various maintenance activities on a specified frequency; and (2) pre-operational inspections of equipment prior to lifting activities. Crane inspection activities are based on the mandatory requirements of applicable industry standards and implement the guidance of NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants."

The Inspection of Overhead Heavy Load and Light Load Handling Systems Program will be enhanced to add specific direction for performance of corrosion inspections of certain hoist lifting assembly components. The enhancement will be completed prior to the period of extended operation.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.22, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.13.7 Conclusion

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. Also, the project team has reviewed the enhancement and determined that the implementation of the enhancement prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.14 COMPRESSED AIR MONITORING PROGRAM (NMP UNIT 1 ONLY) (NMP AMP B2.1.14)

In NMP ALRA, Appendix B, Section B2.1.14, the applicant states that NMP AMP B2.1.14, “Compressed Air Monitoring Program (NMP Unit 1 Only)” is an existing plant program that is consistent with GALL AMP XI.M24, “Compressed Air Monitoring Program,” with exceptions and enhancements.

2.14.1 Program Description

The applicant states, in the NMP ALRA, that this program manages aging effects/mechanisms for portions of the compressed air systems within the scope of license renewal, including cracking and loss of material due to general corrosion, by controlling the internal environment of systems and components. Program activities include air quality checks at various locations to detect contaminants that would affect the system’s intended function. Additional visual inspections are credited for identification and monitoring of degradation for air compressors, receivers, and air dryers. The applicant’s Compressed Air Monitoring Program is based on GL 88-14, “Instrument Air Supply System Problems Affecting Safety-Related Equipment” and recommendations presented in the Institute of INPO Significant Operating Experience Report (SOER) 88-01, “Instrument Air System Failures.”

The applicant also states, in the NMP ALRA, that its Compressed Air Monitoring Program is only applicable to NMP Unit 1, since the components requiring aging management for the NMP Unit 2 compressed air system are managed under NMP AMP B2.1.20, “One-Time Inspection Program,” and NMP AMP B2.1.26, “10 CFR 50 Appendix J Program.”

2.14.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.14 is an existing program that is consistent with GALL AMP XI.M24, with exceptions and enhancements.

The project team interviewed the applicant’s technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.14, including program basis document, LR-PBD-COMPAIR, “Compressed Air Monitoring (Unit 1 Only),” which provides an assessment of the AMP elements’ consistency with GALL AMP XI.M24.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.14 and associated basis documents against GALL AMP XI.24 for consistency.

The applicant also states, in the NMP ALRA, that specific exception is taken to any maintenance recommended in EPRI TR-108147, “Compressor and Instrument Air System Maintenance Guide: Revision to NP-7079” that is not also endorsed by the equipment manufacturers, and to the preservice and inservice testing guidelines of ASME OM-S/G-1998, Part 17, “Performance Testing of Instrument Air Systems Information Notice Light-Water Reactor Power Plants.” During the audit and review, the project team asked the applicant to clarify why this exception was not mentioned in the NMP ALRA. In a letter dated December 1, 2005, the applicant states that it will revise NMP AMP B2.1.14, to read:

> The Compressed Air Monitoring Program is an existing program that will be consistent with GALL AMP XI.M24 (Compressed Air Monitoring), with exceptions, after enhancements are incorporated.

The project team reviewed those portions of the Compressed Air Monitoring program for which the applicant claims consistency with GALL AMP XI.M24 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant’s Compressed Air Monitoring Program provides reasonable assurance that the aging effects/mechanisms for which the program is credited will be adequately managed. The project team finds the applicant’s Compressed Air Monitoring Program acceptable because it conforms to the recommended GALL AMP XI.M24, “Compressed Air Monitoring,” with the exceptions and enhancements as described below.

2.14.3 Exceptions to the GALL Report

The applicant states, in the NMP ALRA, that the exception to the GALL Report program elements is as follows:

> Elements: 2: Preventive Actions
> 4: Detection of Aging Effects
>
> Exception: The NMP Unit 1 takes a limited exception related to maintenance suggestions in EPRI NP-7079, “Instrument Air System: A Guide for Power Plant Maintenance Personnel” and EPRI TR-108147 that are not also endorsed by the manufacturer. NMP Unit 1 takes specific exception to the preservice and inservice testing guidelines of ASME OM-S/G-1998, Part 17. It also takes specific exception to the preservice and inservice testing guidelines of ASME OM-S/G-1998, Part 17.

The GALL Report identifies the following recommendations for the program elements associated with the exception taken:

> Preventive Actions: The system air quality is monitored and maintained in accordance with the plant owner’s testing and inspection plans, which are designed to ensure that

> the system and equipment meet specified operability requirements. These requirements are prepared from consideration of manufacturer's recommendations for individual components and guidelines based on ASME OM-S/G-1998, Part 17; ISA-S7.0.01-1996, “Quality Standard for Instrument Air;” EPRI NP-7079; and EPRI TR-108147.
>
> Detection of Aging Effects: Guidelines in EPRI NP-7079, EPRI TR-108147, and ASME OM-S/G-1998, Part 17, ensure timely detection of degradation of the compressed air system function.

The applicant states, in the NMP ALRA, that its current Compressed Air Monitoring Program includes good practice elements of the general maintenance and inspection activities for the compressor, receiver, and drier as discussed in EPRI TR-108147 (revision to EPRI NP-7079) and ASME OM-S/G-1998, Part 17. The applicant also states that its justification for the GALL Report exception is that the maintenance practices reviewed and enhanced under the NMP Unit 1 response to GL 88-14 are adequate to manage aging without any additional testing and there have been no age-related failures of the compressed air monitoring system under its current program.

During the audit and review, the project team noted that the applicant did not list ANSI/ISA-S7.0.01-1996 in its NMP AMP B2.1.14. The project team inquired whether the applicant uses this standard for its air quality standards. In a letter dated December 1, 2005, the applicant states that it will add the following for clarification:

> NMP also takes exception to the use of ISA-S7.0.01-1996 for air quality standards. This is acceptable because the system air quality is monitored and maintained in compliance with the requirements of ANSI/ISA-S7.3-1975, “Air Quality Standards for Pneumatic Instruments” which meets or exceeds the quality requirements for dew point, hydrocarbons, and particulate of Section 4.4 of EPRI TR-108147 and ISA-S7.0.01-1996.

The project team agreed with the applicant’s assessment because the air quality standard based on ANSI/ISA-S7.3-1975 is more conservative than ANSI/ISA-S7.0.01-1996 standard.

During the audit and review, the project team noted that (1) the applicant had performed a satisfactory design and operations verification of the instrument air system in response to GL 88-14; (2) the applicant has incorporated INPO’s good engineering practice recommendations on the instrument air system into its maintenance procedures, as described in INPO SOER 88-01, (3) the applicant’s air sampling analysis procedure, N1-CTP-Q921, “Instrument Air Sampling Analysis,” specifies the quality requirements of dew point, oil, water, and particle size, based on ANSI/ISA-S7.0.01-1975, “Quality Standard for Instrument Air,” (4) the applicant routinely performs the preventative maintenance and inspection on the compressor and carbon steel components to limit the introduction of contaminants into the air supply, and (5) the applicant regularly tests the active compressed air system valves and skid mounted compressor components to ensure their operability. All of the above activities demonstrate that the applicant has an adequate preventive maintenance program to address various aspects of the inoperability of air-operated components due to corrosion and the presence of oil, water, rust, and other contaminants. In addition, the review of the applicant's operating experience (see Section 2.14.5, below), indicates that the applicant's Compressed Air Monitoring Program has a good track record of ensuring that the design basis function of the system is maintained. Therefore, the project team agreed with the applicant's assessment and concludes that the applicant's current Compressed Air Monitoring Program includes good practice elements of the general maintenance and inspection activities for the compressor, receiver, and drier as discussed in EPRI TR-108147 (revision to EPRI NP-7079) and ASME OM-S/G-1998, Part 17. On this basis, the project team finds this exception acceptable.

2.14.4 Enhancements

The applicant states, in the NMP ALRA, that the enhancements in meeting the GALL Report program elements are as follows:

Elements:	1: Scope of Program 2: Preventive Actions 4: Detection of Aging Effects 5: Monitoring and Trending 6: Acceptance Criteria
Enhancements:	Revise applicable existing procedures to ensure that the procedures address the above GALL Report elements. Scope of Program, Preventive Action, Detection of Aging Effects - Develop new activities to manage the loss of material, stress corrosion cracking, and perform periodic system leak checks. Expand the scope, periodicity, and inspection techniques to ensure that the aging of certain subcomponents of the dryers and compressors (e.g., valves, heat exchangers) are managed. (Commitment 18 for NMP Unit 1) Monitoring and Trending - Establish activities that manage the aging of the internal surfaces of carbon steel piping and that require system leak checks to detect deterioration of the pressure boundaries. (Commitment 18 for NMP Unit 1) Acceptance Criteria - Expand the acceptance criteria to ensure that the aging of certain subcomponents of the dryers and compressors (e.g., valves, heat exchangers) are managed. (Commitment 18 for NMP Unit 1)

The GALL Report identifies the following recommendations for the program elements associated with the enhancement:

Scope of Program: The program manages the effects of corrosion and the presence of unacceptable levels of contaminants on the intended function of the compressed air system. The AMP includes frequent leak testing of valves, piping, and other system components, especially those made of carbon steel, and a preventive maintenance program to check air quality at several locations in the system.

Preventive Actions: The system air quality is monitored and maintained in accordance with the plant owner's testing and inspection plans, which are designed to ensure that the system and equipment meet specified operability requirements. The preventive maintenance program addresses various aspects of the inoperability of air-operated components due to corrosion and the presence of oil, water, rust, and other contaminants.

Detection of Aging Effects: Ensure timely detection of degradation of the compressed air system function. Degradation of the piping and any equipment would become evident by observation of excessive corrosion, by the discovery of unacceptable leakage rates, and by failure of the system or any item of equipment to meet specified performance limits.

Monitoring and Trending: Effects of corrosion and the presence of contaminants are monitored by visual inspection and periodic system and component tests, including leak rate tests on the system and on individual items of equipment. These tests verify proper operation by comparing measured values of performance with specified performance limits. Test data are analyzed and compared to data from previous tests to provide for timely detection of aging effects/mechanisms.

Acceptance Criteria: Acceptance criteria is established for the system and for individual equipment that contain specific limits or acceptance ranges based on design basis conditions and/or equipment vendor specifications. The testing results are analyzed to verify that the design and performance of the system is in accordance with its intended function.

The applicant states, in its program basis document, that these enhancements are required to develop activities that manage loss of material due to general corrosion of carbon steel components upstream of the dryers such as piping, receivers, and valves. Other required new activities will address the stress corrosion cracking of red brass pipe, and perform periodic system leak checks. Certain existing activities will be revised to expand the scope, periodicity, and inspection techniques so that the aging of certain sub-components of the dryers and compressors such as solenoid operated valves (SOVs) and heat exchangers is adequately addressed. The project team noted that these additional activities are the results of the applicant's continuing evaluation of its Compressed Air Monitoring Program to account for internal and external plant operating experience issues. On this basis, the project team finds these enhancements acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

2.14.5 Operating Experience

The applicant states, in the NMP ALRA, that since its inception in 1992, the Compressed Air Monitoring Program at NMP has effectively detected the buildup of corrosion products and prevented component failure. NMP Unit 1 has experienced age related degradation due to stress corrosion cracking in unannealed red brass piping in areas that may have been chemically contaminated. However, no pneumatic component within the scope of license renewal has experienced a loss of intended function due to corrosion, corrosion product buildup, or dirt buildup in the instrument air system.

The applicant also states, in the NMP ALRA, that it has reviewed both industry and plant-specific operating experience relating to its Compressed Air Monitoring Program and it continually adjusts to account for internal and external plant operating experience issues. Through discussions with the applicant's technical staff and a sampling review of the DER list that was associated with the applicant's Compressed Air Monitoring Program, the project team concurred that the applicant is effective in incorporating the operating experience into its operations. The project team concludes that the effectiveness of the applicant's operating experience evaluation program provides reasonable assurance that operating experience will be reviewed in the future to provide objective evidence to support the conclusion that the effects of aging will be adequately managed.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's Compressed Air Monitoring Program (NMP Unit 1 Only) will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.14.6 UFSAR Supplement

The applicant provides its UFSAR Supplement for the Compressed Air Monitoring Program in NMP ALRA, Appendix A, Section A1.1.14, which states that its Compressed Air Monitoring Program manages aging effects/mechanisms for portions of the compressed air systems within the scope of license renewal, including cracking and loss of material due to general corrosion, by controlling the internal environment of systems and components. Program activities include air quality checks at various locations to detect contaminants that would affect the system's intended function. Additional visual inspections are credited for identification and monitoring of degradation for air compressors, receivers, and air dryers. The applicant's Compressed Air Monitoring Program is based on GL 88-14 and recommendations presented in INPO SOER 88-01. The program also includes good practice elements of the general maintenance and inspection activities for the compressor, receiver, and air drier discussed in EPRI TR-108147 (revision to EPRI NP-7079) and ASME OM-S/G-1998, Part 17. However, specific exception is taken to any maintenance recommended in EPRI TR-108147 that is not also endorsed by the equipment manufacturers, and to the preservice and inservice testing guidelines of ASME OM-S/G-1998, Part 17.

During the audit and review, the project team noted that the applicant did not list ANSI/ISA-S7.0.01-1996 in its NMP AMP B2.1.14. The project team inquired whether the applicant uses this standard for its air quality standards. In a letter dated December 1, 2005, the applicant states that it will add the following to the first paragraph in NMP ALRA (Page A1-8) for clarification:

> NMP also takes exception to the use of ISA-S7.0.01-1996 for air quality standards. The system air quality is monitored and maintained in compliance with the requirements of ANSI/ISA-S7.3-1975 which meets or exceeds the quality requirements for dew point, hydrocarbons, and particulate of Section 4.4 of EPRI TR-108147 and ISA-S7.0.01-1996.

The project team agreed with the applicant's assessment because the air quality standard based on ANSI/ISA-S7.3-1975 is more conservative than ANSI/ISA-S7.0.01-1996 standard. The applicant also states, in the NMP ALRA, that the enhancements to its Compressed Air Monitoring Program include the following revisions to existing activities that are credited for license renewal:

- Develop new activities to manage the loss of material, stress corrosion cracking, and perform periodic system leak checks.

- Expand the scope, periodicity, and inspection techniques to ensure that the aging of certain sub-components of the dryers and compressors (e.g., valves, heat exchangers) is managed.

- Establish activities that manage the aging of the internal surfaces of carbon steel piping and that require system leak checks to detect deterioration of the pressure boundaries.

- Expand the acceptance criteria to ensure that the aging of certain subcomponents of the dryers and compressors (e.g., valves, heat exchangers) is managed.

- Develop and implement the activities to address the failure mechanism of stress corrosion cracking in unannealed red brass piping in NMP Unit 1.

In addition, the applicant states, in the NMP ALRA, that these enhancements will be completed prior to the period of extended operation.

The project team reviewed the UFSAR Supplement for NMP AMP B2.1.14, found that it was consistent with the GALL Report, and determined that it provides an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.14.7 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, the project team has reviewed the exception and the associated justification and determined that the AMP, with the exception is adequate to manage the aging effects/mechanisms for which it is credited. Also, the project team has reviewed the enhancements and determined that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR Supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.15 BWR REACTOR WATER CLEANUP SYSTEM PROGRAM (NMP AMP B2.1.15)

In NMP ALRA, Appendix B, Section B2.1.15, the applicant states that NMP AMP B2.1.15, "BWR Reactor Water Cleanup System Program," is an existing plant program that is consistent with GALL AMP XI.M25, "BWR Reactor Water Cleanup System," with an exception.

2.15.1 Program Description

The applicant states, in the NMP ALRA, that this program manages the effects of SCC or IGSCC on the intended function of austenitic stainless steel piping in the reactor water cleanup (RWCU) system. This program is based on the NRC criteria related to inspection guidelines for RWCU piping welds outboard of the containment isolation valve as delineated in NUREG-0313, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping," and GL 88-01, "NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping." An exception is taken to the acceptance criteria program element in that NMP Unit 1 utilizes the 1989 Edition with no addenda of the ASME Section XI Code versus the 1995 Edition through the 1996 Addenda as defined in the GALL Report. The design of the NMP Unit 2 RWCU system is such that carbon steel piping welds are not required to be examined in accordance with GL 88-01.

In addition, the applicant states, in the NMP ALRA, that the attributes of the BWR Reactor Water Cleanup System Program related to maintaining reactor coolant water chemistry are included in NMP AMP B2.1.2, "Water Chemistry Control Program."

2.15.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.15 is consistent with GALL AMP XI.M25, with an exception.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.15, including program basis document, LR-PBD-RWCU, “BWR Reactor Water Cleanup System,” which provides an assessment of the AMP elements' consistency with GALL AMP XI.M25.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.15 and associated basis documents against GALL AMP XI.M25 for consistency.

The project team reviewed those portions of the BWR Reactor Water Cleanup System Program for which the applicant claims consistency with GALL AMP XI.M25 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant’s BWR Reactor Water Cleanup System Program provides reasonable assurance that the aging effects/mechanisms stress corrosion cracking or intergranular stress corrosion cracking on the intended function of austenitic stainless steel piping in the reactor water cleanup system. The project team finds the applicant’s BWR Reactor Water Cleanup System Program acceptable because it conforms to the recommended GALL AMP XI.M25, “BWR Reactor Water Cleanup System,” with the exception as described below.

2.15.3 Exceptions to the GALL Report

The applicant states, in the NMP ALRA, that the exception to the GALL Report program element is as follows:

Element: 6: Acceptance Criteria
Exception: The program described in GALL AMP XI.M25, cites ASME Section XI requirements covered in the 1995 Edition through the 1996 Addenda for the acceptance criteria element. NMP Unit 1 utilizes the 1989 Edition with no addenda.

The GALL Report identifies the following recommendation for the “acceptance criteria” program element associated with the exception taken:

> The NRC GL 88-01 recommends that any indication detected be evaluated in accordance with the requirements of ASME Section XI, Subsection IWB-3640 (1995 Edition through the 1996 Addenda).

During the audit and review, the project team requested that the applicant provide clarification about the ASME Edition that would be used for aging management during the extended period of operation. The applicant states that the use of later Code Editions and Addenda of ASME Section XI is determined in accordance with the 10 CFR 50.55a requirements, 12 months prior to the start of 120-month inspection intervals. It is subject to the limitations and modifications by the NRC, and requires NRC approval. The project team finds this response acceptable since the applicant clarified that although the ASME XI Edition 1989 is currently approved for the ISI Program, during the extended period of operation the ASME XI Edition will be determined based on the edition of the Code determined to be applicable according to the regulation. On this basis, the project team finds this exception acceptable.

2.15.4 Enhancements

None

2.15.5 Operating Experience

The applicant states, in the NMP ALRA, that it has reviewed both industry and plant-specific operating experience relating to cracking in its reactor water cleanup system. Review of plant-specific operating experience for NMP Unit 1 identified that leaks were experienced in two welds outboard of the second isolation valve. Weld 33-FW-22 had undergone a localized repair during its original construction and consequently, became more sensitized. Weld 33-FW-23A is a one-of-a-kind design configuration that promotes very high stresses due to the fact that it connects very large shells that have different thermal movement that cannot be accommodated by the short and stiff pipe. In addition the pipe is subject to thermal cycling. Both welds were repaired by a full structural weld overlay.

During the audit and review, the project team reviewed plant-specific experience documented in DER-NM-1997-1484 and summarized in the RWCU program basis document. The DER addressed a leak in the RWCU system from a 7/16” axial crack (in a bimetallic weld where stainless steel piping was replaced with carbon steel). The mechanism was classified as IGSCC, and the leak was repaired with a weld overlay. This type of leak was discussed in GL 88-01. To confirm that this weld failure is an isolated case, the applicant performed additional UT exams on a sample of three other RWCU welds. The sample size was based on the planned sample expansion criteria used during outages for RWCU inspections performed to comply with GL 88-01.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant’s BWR Reactor Water Cleanup System Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.15.6 UFSAR and USAR Supplements

The applicant provides its UFSAR Supplement for the BWR Reactor Water Cleanup System Program in NMP ALRA, Appendix A, Section A1.1.9 for NMP Unit 1, which states that the BWR Reactor Water Cleanup System Program manages the effects of SCC or IGSCC on the intended function of austenitic stainless steel piping in the reactor water cleanup system. This program is based on the NRC criteria related to inspection guidelines for RWCU piping welds outboard of the second isolation valve as delineated in NUREG-0313 and GL 88-01. An exception is taken to the acceptance criteria program element in that NMP Unit 1 utilizes the 1989 Edition with no addenda of the ASME Section XI Code versus the 1995 Edition through the 1996 Addenda as defined in the GALL Report. The attributes of the applicant's BWR Reactor Water Cleanup System Program related to maintaining reactor coolant water chemistry are included in its Water Chemistry Control Program.

In addition, the applicant provides its USAR Supplement for the BWR Reactor Water Cleanup System Program in NMP ALRA, Appendix A, Section A2.1.10 for NMP Unit 2, which states that the BWR Reactor Water Cleanup System Program manages the effects of SCC or IGSCC on the intended function of austenitic stainless steel piping in the reactor water cleanup system. This program is based on the NRC criteria related to inspection guidelines for RWCU piping welds outboard of the containment isolation valve as delineated in NUREG-0313 and GL 88-01. The design of the NMP Unit 2 RWCU system is such that carbon steel piping welds are not required to be examined in accordance with GL 88-01. The attributes of the applicant's BWR Reactor Water Cleanup System Program related to maintaining reactor coolant water chemistry are included in its Water Chemistry Control Program.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.15, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.15.7 Conclusion

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the project team has reviewed the exception and the associated justifications and determined that the AMP, with the exception is adequate to manage the aging effects/mechanisms for which it is credited. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.16 FIRE PROTECTION PROGRAM (NMP AMP B2.1.16)

In NMP ALRA, Appendix B, Section B2.1.16, the applicant states that NMP AMP B2.1.16, "Fire Protection Program," is an existing plant program that is consistent with GALL AMP XI.M26, "Fire Protection Program," with exceptions and enhancements.

2.16.1 Program Description

The applicant states, in the NMP ALRA, that this program provides guidance for performance of periodic visual inspections to manage aging of the various materials comprising rated fire barriers. These include (a) sealants in rated penetration seals (subject to shrinkage due to weathering); (b) concrete and steel in fire rated walls, ceilings, and floors (subject to loss of material due to flaking and abrasion; separation and concrete damage due to relative motion, vibration, and shrinkage); and (c) steel in rated fire doors (subject to loss of material due to corrosion and wear or mechanical damage). In addition, the program requires testing of the diesel-driven fire pump to verify that it is performing its intended function. This activity manages aging of the diesel engine's fuel oil supply line and exhaust system, which may experience loss of material due to corrosion. Inspection and testing is performed in accordance with the guidance of applicable standards.

2.16.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.16 is consistent with GALL AMP XI.M26, with exceptions and enhancements.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.16, including program basis document, LR-PBD-FIREPRO, "Fire Protection," which provides an assessment of the AMP elements' consistency with GALL AMP XI.M26.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.16 and associated basis documents against GALL AMP XI.M26 for consistency.

The project team reviewed those portions of the Fire Protection Program for which the applicant claims consistency with GALL AMP XI.M26 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's Fire Protection Program provides reasonable assurance that the components managed by its Fire Protection Program are adequately managed and is therefore acceptable. The project team finds the applicant's Fire Protection Program acceptable because it conforms to the recommended GALL AMP XI.M26, "Fire Protection," with the exceptions and enhancements as described below.

2.16.3 Exceptions to the GALL Report

The applicant states, in the NMP ALRA, that the exception to the GALL Report program element is as follows:

Element: 3: Parameters Monitored/Inspected
Exception: NMP takes exception to the program element described in GALL AMP XI.M26, where it requires that hollow metal fire doors be inspected at least once bi-monthly, and that halon/carbon dioxide suppression system valve lineup inspections be performed on a monthly basis. Rather, NMP is consistent with ISG-04, "Aging Management of Fire Protection Systems for License Renewal" on both issues.

C NMP will revise the current fire door inspection frequency to comply with a plant-specific evaluation to be completed as an enhancement. While it is an exception to the GALL Report, this is consistent with ISG-04 and the latest regulatory guidance.

The GALL Report identifies the following recommendation for the “parameters monitored/ inspected” program element associated with the exception taken:

> Visual inspection of 10% of each type of penetration seal is performed during walkdowns carried out at least once every refueling outage. These inspections examine any sign of degradation such as cracking, seal separation from walls and components, separation of layers of material, rupture and puncture of seals which are directly caused by increased hardness and shrinkage of seal material due to weathering. Visual inspection of the fire barrier walls, ceilings, and floors examines any sign of degradation such as cracking, spalling, and loss of material caused by freeze-thaw, chemical attack, and reaction with aggregates. Hollow metal fire doors are visually inspected at least once bi-monthly for holes in the skin of the door. Fire door clearances are also checked at least once bi-monthly as part of an inspection program. Function tests of fire doors are performed daily, weekly, or monthly (which may be plant-specific) to verify the operability of automatic hold-open, release, closing mechanisms, and latches.
>
> The diesel-driven fire pump is under observation during performance tests such as flow and discharge tests, sequential starting capability tests, and controller function tests for detecting any degradation of the fuel supply line.
>
> Periodic visual inspection and function test at least once every six months examines the signs of degradation of the halon/carbon dioxide fire suppression system. The suppression agent charge pressure is monitored in the test. Material conditions that may affect the performance of the system, such as corrosion, mechanical damage, or damage to dampers, are observed during these tests. Inspections performed at least once every month verify that the extinguishing agent supply valves are open and the system is in automatic mode.

The applicant states, in the NMP ALRA, that the current fire doors inspection frequency will be changed to comply with a plant-specific evaluation. The plant-specific inspection intervals are to be determined by an engineering evaluation. This change is consistent with ISG-04, where it is stated that fire doors are visually inspected on a plant-specific interval to verify the integrity of door surfaces and for clearances. This is stated in Commitment 19 of Appendix A1.4 and Commitment 17 of Appendix A2.4 in the NMP ALRA. On this basis, the project team finds this exception acceptable.

The applicant further states, in the NMP ALRA, that the exception to the GALL Report program element is as follows:

> Element: 4: Detection of Aging Effects

Exception: NMP takes exception to the program element described in GALL AMP XI.M26, where it requires that hollow metal fire doors be inspected at least once bi-monthly, and that halon/carbon dioxide suppression system valve lineup inspections be performed on a monthly basis. Rather, NMP is consistent with ISG-04 on both issues.

- Valve lineups on the carbon dioxide/halon suppression systems are not credited for aging management in the Fire Protection Program at NMP. This is also consistent with ISG-04 and the latest regulatory guidance of GL-86-10.

The GALL Report identifies the following recommendation for the “detection of aging effects” program element associated with the exception taken:

> Visual inspection of penetration seals detects cracking, seal separation from walls and components, and rupture and puncture of seals. Visual inspection (VT-1 or equivalent) of 10% of each type of seal in walkdowns is performed at least once every refueling outage. If any sign of degradation is detected within that 10%, the scope of the inspection and frequency is expanded to ensure timely detection of increased hardness and shrinkage of the penetration seal before the loss of the component intended function. Visual inspection (VT-1 or equivalent) of the fire barrier walls, ceilings, and floors performed in walkdown at least once every refueling outage ensures timely detection for concrete cracking, spalling, and loss of material. Visual inspection (VT-3 or equivalent) detects any sign of degradation of the fire door such as wear and missing parts. Function tests promptly detect deficiencies in operational conditions. Periodic visual inspection and function tests detect degradation of the fire doors before there is a loss of intended function.
>
> Periodic tests performed at least once every refueling outage, such as flow and discharge tests, sequential starting capability tests, and controller function tests performed on diesel-driven fire pump ensure fuel supply line performance. The performance tests detect degradation of the fuel supply lines before the loss of the component intended function.
>
> In the test of the halon/carbon dioxide fire suppression system, the suppression agent charge pressure is verified to be within in the normal band. Visual inspection detects any sign of degradation, such as corrosion, mechanical damage, or damage to dampers. The periodic function test and inspection performed at least once every six months detects degradation of the halon/carbon dioxide fire suppression system before the loss of the component intended function. The monthly inspection ensures that the extinguishing agent supply valves are open and the system is in automatic mode.

The applicant states, in the NMP ALRA, that valve lineups on the carbon dioxide/halon suppression systems will not be credited for aging management in its Fire Protection Program.

This is consistent with ISG-04. The project team reviewed this exception, along with ISG-04. ISG-04 states that valve lineup inspection, charging pressure inspection, and an automatic mode of operation verification are operational activities pertaining to system or component configurations or properties that may change, and are not related to aging management. On this basis, the project team finds this exception acceptable.

2.16.4 Enhancements

The applicant states, in the NMP ALRA, that the enhancements in meeting the GALL Report program elements are as follows:

Elements: 1: Scope of Program
3: Parameters Monitored/Inspected
4: Detection of Aging Effects
6: Acceptance Criteria

Enhancements: Revise applicable existing procedures to ensure that the procedures address the following elements:

- Incorporate periodic visual inspections of piping and fittings in a non-water environment such as halon and carbon dioxide fire suppression systems components, to detect evidence of corrosion and any system mechanical damage that could affect its intended function. (Commitment 19 for NMP Unit 1 and Commitment 17 for NMP Unit 2)

- Expand the scope of periodic functional tests of the diesel-driven fire pump to include inspection of engine exhaust system components to verify that loss of material is managed. (Commitment 19 for NMP Unit 1 and Commitment 17 for NMP Unit 2)

- Perform an engineering evaluation to determine the plant-specific inspection periodicity of fire doors. (Commitment 19 for NMP Unit 1 and Commitment 17 for NMP Unit 2)

The GALL Report identifies the following recommendations for the program elements associated with the enhancements:

Scope of Program: For operating plants, the AMP manages the aging effects on the intended function of the penetration seals, fire barrier walls, ceilings, and floors, and all fire rated doors (automatic or manual) that perform a fire barrier function. It also manages the aging effects on the intended function of the fuel supply line. The AMP also includes management of the aging effects on the intended function of the halon/carbon dioxide fire suppression system.

Parameters Monitored/Inspected: Visual inspection of 10% of each type of penetration seal is performed during walkdowns carried out at least once every refueling outage. These inspections examine any sign of degradation such as cracking, seal separation from walls and components, separation of layers of material, rupture and puncture of seals which are directly caused by increased hardness and shrinkage of seal material due to weathering. Visual inspections of the fire barrier walls, ceilings, and floors examine any sign of degradation such as cracking, spalling, and loss of material caused by freeze-thaw, chemical attack, and reaction with aggregates. Hollow metal fire doors are visually inspected at least once bi-monthly for holes in the skin of the door. Fire door clearances are also checked at least once bi-monthly as part of an inspection program. Function tests of fire doors are performed daily, weekly, or monthly (which may be plant-specific) to verify the operability of automatic hold-open, release, closing mechanisms, and latches. The diesel-driven fire pump is under observation during performance tests such as flow and discharge tests, sequential starting capability tests, and controller function tests for detecting any degradation of the fuel supply line. Periodic visual inspection and function test at least once every six months examines the signs of degradation of the halon/carbon dioxide fire suppression system. The suppression agent charge pressure is monitored in the test. Material conditions that may affect the performance of the system, such as corrosion, mechanical damage, or damage to dampers, are observed during these tests. Inspections performed at least once every month verify that the extinguishing agent supply valves are open and the system is in automatic mode.

Detection of Aging Effects: Visual inspection of penetration seals detects cracking, seal separation from walls and components, and rupture and puncture of seals. Visual inspection (VT-1 or equivalent) of 10% of each type of seal in walkdowns is performed at least once every refueling outage. If any sign of degradation is detected within that 10%, the scope of the inspection and frequency is expanded to ensure timely detection of increased hardness and shrinkage of the penetration seal before the loss of the component intended function. Visual inspection (VT-1 or equivalent) of the fire barrier walls, ceilings, and floors performed in walkdown at least once every refueling outage ensures timely detection for concrete cracking, spalling, and loss of material. Visual inspection (VT-3 or equivalent) detects any sign of degradation of the fire door such as wear and missing parts. Function tests promptly detect deficiencies in operational conditions. Periodic visual inspection and function tests detect degradation of the fire doors before there is a loss of intended function.

Periodic tests performed at least once every refueling outage, such as flow and discharge tests, sequential starting capability tests, and controller function tests performed on diesel-driven fire pumps ensure fuel supply line performance. The performance tests detect degradation of the fuel supply lines before the loss of the component intended function.

In the test of the halon/carbon dioxide fire suppression system, the suppression agent charge pressure is verified to be within in the normal band. Visual inspection detects any sign of degradation, such as corrosion, mechanical damage, or damage to dampers. The periodic function test and inspection performed at least once every six months detects degradation of the halon/carbon dioxide fire suppression system before the loss of the component intended function. The monthly inspection ensures that the extinguishing agent supply valves are open and the system is in automatic mode.

Acceptance Criteria: Inspection results are acceptable if there are no visual indications of cracking, separation of seals from walls and components, separation of layers of material, or ruptures or punctures of seals, no visual indications of concrete cracking, spalling and loss of material of fire barrier walls, ceilings, and floors, no visual indications of missing parts, holes, and wear and no deficiencies in the functional tests of fire doors. No corrosion is acceptable in the fuel supply line for the diesel-driven fire pump. Also, any signs of corrosion and mechanical damage of the halon/carbon dioxide fire suppression system are not acceptable.

The applicant states, in the NMP ALRA, that periodic visual inspections of piping and fittings in a non-water environment such as halon and carbon dioxide fire suppression systems components will be incorporated in the procedures for its Fire Protection Program. This is stated in Commitment 19 of Appendix A1.4 and Commitment 17 of Appendix A2.4 in the NMP ALRA. This is consistent with ISG-04 which provides a specific frequency for both inspection and functional tests. The project team finds that the enhancement adequately manages the aging effects of piping and fittings in halon and carbon dioxide fire suppression systems components.

The applicant states, in the NMP ALRA, that the scope of periodic functional tests of the diesel-driven fire pump will be expanded to include inspection of engine exhaust system components. This is stated in Commitment 19 of Appendix A1.4 and Commitment 17 of Appendix A2.4 in the NMP ALRA. The project team finds that the enhancement adequately manages to maintain the functional reliability of the diesel-driven fire pump.

The applicant states, in the NMP ALRA, that an engineering evaluation will be performed to determine the plant-specific inspection frequency of fire doors. This is stated in Commitment 19 of Appendix A1.4 and Commitment 17 of Appendix A2.4 in the NMP ALRA. The project team reviewed this enhancement and finds that while this enhancement is not consistent with the GALL Report, it is consistent with the ISG-04 and the latest regulatory guidance. ISG-04 states that hollow metal fire doors are to be inspected on a plant-specific interval and that this interval is to be determined through an engineering evaluation. On this basis, the project team finds this enhancement acceptable.

The applicant states, in a letter dated November 17, 2005, that the enhancement in meeting the GALL Report program element is as follows:

Element:	4: Detection of Aging Effects
Enhancement:	Revise applicable existing procedures to ensure that the procedures address the following elements:

- Revise halon and carbon dioxide functional test frequencies to semi-annual to allow detection of aging effect.
  (Commitment 19 for NMP Unit 1 and Commitment 17 for NMP Unit 2)

The GALL Report identifies the following recommendations for the "detection of aging effects" program element associated with the enhancement:

> In the test of the halon/carbon dioxide fire suppression system, the suppression agent charge pressure is verified to be within the normal band. Visual inspection detects any sign of degradation, such as corrosion, mechanical damage, or damage to dampers. The periodic function test and inspection performed at least once every six months detects degradation of the halon/carbon dioxide fire suppression system before loss of the component intended function. The monthly inspection ensures that the extinguishing agent supply valves are open and the system is in automatic mode.

The applicant states, in a letter dated November 17, 2005, that halon and carbon dioxide functional test frequencies will be changed to semi-annual in the procedures for its Fire Protection Program. In the letter, this is stated as an addition to Commitment 19 of Appendix A1.4 and Commitment 17 of Appendix A2.4 of the NMP ALRA. The project team reviewed this enhancement and finds that it is consistent with the GALL Report. On this basis, the project team finds this enhancement acceptable.

2.16.5 Operating Experience

The applicant states, in the NMP ALRA, that it has evaluated applicable industry operating experience. Applicable guidelines and requirements have been incorporated into its Fire Protection Program implementing procedures. Minor degradation has been identified while performing Fire Protection Program activities (e.g., fire barrier penetration seals found damaged or cracked, fire dampers failed surveillance testing, and fire door inspections not satisfactory) and corrective actions taken. No significant age-related problems have been reported for the applicant's fire protection systems and components managed by its Fire Protection Program.

In addition, the applicant states, in the NMP ALRA, that its Fire Protection Program is continually adjusted to account for industry experience and research. As additional operating experience is obtained, lessons learned will be used to adjust this program as needed.

On the basis of its review of the above operating experience at the applicant's plant and at other nuclear facilities, as well as discussions with the applicant's technical staff, the project team concludes that NMP AMP B2.1.16 adequately manages the aging effects that have been observed at the applicant's plant.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's Fire Protection Program will adequately manage the aging effects that are identified in the NMP ALRA for which this AMP is credited.

2.16.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the Fire Protection Program in NMP ALRA, Appendix A, Section A1.1.17 for NMP Unit 1 and Section A2.1.17 for NMP Unit 2, respectively, which state that its Fire Protection Program provides guidance for performance of periodic visual inspections to manage aging of the various materials comprising rated fire barriers. These include (a) sealants in rated penetration seals (subject to shrinkage due to weathering); (b) concrete and steel in fire rated walls, ceilings, and floors (subject to loss of material due to flaking and abrasion; separation and concrete damage due to relative motion, vibration, and shrinkage); and (c) steel in rated fire doors (subject to loss of material due to corrosion and wear or mechanical damage). In addition, this program requires testing of the diesel-driven fire pump to verify that it is performing its intended function. This activity manages aging of the fuel oil supply line to and the exhaust system from the diesel engine, both of which may experience loss of material due to corrosion. Inspection and testing is performed in accordance with the guidance of applicable standards.

The applicant also states that it takes two exceptions to the Fire Protection Program as described in the GALL Report. NMP will perform inspections on hollow metal fire doors on a plant-specific schedule and will not use valve lineups for aging management of fire suppression systems. These exceptions are consistent with ISG-04.

Furthermore, the applicant states in the NMP ALRA, that an enhancement will be made to the Fire Protection Program that will include periodic visual inspections of piping and fittings in a non-water environment in the halon and carbon dioxide fire suppression systems components to detect signs of degradation. Additionally, an enhancement will be made to periodically functional tests of the diesel-driven fire pump to include inspection of engine exhaust system components to verify that loss of material is managed. Finally, the fire door inspection frequency will be determined by a plant-specific analysis. These enhancements will be completed prior to the period of extended operation.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.16, and found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.16.7 Conclusion

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the project team has reviewed the exceptions and its associated justifications and determined that the AMP, with the exceptions is adequate to manage the aging effects for which it is credited. Also, the project team has reviewed the enhancements and determined that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.17 FIRE WATER SYSTEM PROGRAM (NMP AMP B2.1.17)

In NMP ALRA, Appendix B, Section B2.1.17, the applicant states that NMP AMP B2.1.17, "Fire Water System Program," is an existing plant program that is consistent with GALL AMP XI.M27, "Fire Water System," with enhancements.

2.17.1 Program Description

The applicant states, in the NMP ALRA, that this program manages aging of water-based fire protection systems due to loss of material and biofouling. Program activities include periodic maintenance, testing, and inspection of system piping and components containing water (e.g., sprinklers, nozzles, fittings, valves, hydrants, hose stations, and standpipes). Inspection and testing is performed in accordance with the guidance of applicable National Fire Protection Association (NFPA) Codes and Standards and the Nuclear Electric Insurance Limited (NEIL) Members' Manual. The applicant states, in a letter dated November 17, 2005, an enhancement to develop new procedures and preventive maintenance tasks to implement sprinkler head replacement and/or inspections will be added under Program Description. In the letter this is stated as an addition to Commitment 20 of Appendix A1.4 and Commitment 18 of Appendix A2.4 of the NMP ALRA.

2.17.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.17 is consistent with GALL AMP XI.M27, with enhancements.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.17, including the program basis document, LR-PBD-FIREWATER, “Fire Water,” which provides an assessment of the AMP elements' consistency with GALL AMP XI.M27.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.17 and associated basis documents against GALL AMP XI.M27 for consistency.

The project team reviewed those portions of the Fire Water System Program for which the applicant claims consistency with GALL AMP XI.M27 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant’s Fire Water System Program provides reasonable assurance that the aging effects for the components in the scope of its Fire Water System Program is adequately managed. The project team finds the applicant’s Fire Water System Program acceptable because it conforms to the recommended GALL AMP XI.M27, “Fire Water System,” with the enhancements as described below.

2.17.3 Exceptions to the GALL Report

None

2.17.4 Enhancements

The applicant states, in the NMP ALRA and in a letter dated November 17, 2005, that the enhancements in meeting the GALL Report program element is as follows:

Element: 1: Scope of Program
Enhancements: Revise applicable existing procedures to ensure that the procedures address the following element:

- Incorporate inspections to detect and manage loss of material due to corrosion into existing periodic test procedures.
(Commitment 20 for NMP Unit 1 and Commitment 18 for NMP Unit 2)

- Incorporate requirement for procedures and Preventative Maintenance tasks to the sprinkler head replacement and/ or inspections to meet National Fire Protection Association (NFPA) 25, “Inspection, Testing, and Maintenance of Water based Fire Protection System,” Section 5.3.1 (2003 Edition) requirements.
(Commitment 20 for NMP Unit 1 and Commitment 18 for NMP Unit 2)

The GALL Report identifies the following recommendation for the “scope of program” program element associated with the enhancement:

> The aging management program focuses on managing loss of material due to corrosion, MIC, or biofouling of carbon steel and cast-iron components in fire protection systems exposed to water. Hose station and standpipe are considered as piping in the AMP.

The applicant states, in the NMP ALRA, that an enhancement will be added to the scope of the AMP. Inspections to detect and manage loss of material due to corrosion will be incorporated into existing periodic test procedures. This is stated in Commitment 20 of Appendix A1.4 and Commitment 18 of Appendix A2.4 of NMP ALRA. The GALL Report recommends that portions of the fire protection suppression piping located above ground and exposed to water be disassembled and internally visually inspected once every refueling outage. ISG-04, "Aging Management of Fire Protection Systems for License Renewal" recommends the use of non-intrusive testing of the piping system. The incorporation of new inspection and NFPA 25 requirements into existing procedures will satisfy ISG-04. The project team finds this enhancement acceptable.

In addition, the applicant states, in a letter dated November 17, 2005, that new procedures and preventive maintenance tasks to implement sprinkler head replacement and/or inspections to meet NFPA 25 will be added to its Fire Water System Program. This is stated in the letter as an addition to Commitment 20 of Appendix A1.4 and Commitment 18 of Appendix A2.4 of the NMP ALRA. The project team reviewed this enhancement and finds that it is consistent with the GALL Report. On this basis, the project team finds this enhancement acceptable.

The applicant also states, in the NMP ALRA and in a letter dated November 17, 2005, that the enhancements in meeting the GALL Report program element is as follows:

> Element: 2: Preventive Actions
>
> Enhancements: Revise applicable existing procedures to ensure that the procedures address the following element:
>
> C Specify periodic component inspections to verify that loss of material is being managed.
> (Commitment 20 for NMP Unit 1 and Commitment 18 for NMP Unit 2)
>
> C Add new requirements to procedures and preventative maintenance tasks to implement sprinkler head replacement and/or inspections scope.
> (Commitment 20 for NMP Unit 1 and Commitment 18 for NMP Unit 2)

The GALL Report identifies the following recommendation for the "preventive actions" program element associated with the enhancement:

> To ensure no significant corrosion, MIC, or biofouling has occurred in water-based fire protection systems, periodic flushing, system performance testing, and inspections are conducted.

The applicant states, in the NMP ALRA, that enhancement to improve the periodicity of inspection for components will be added to the scope of its Fire Water System Program to further ensure that loss of material is being managed. The improvement of inspection periodicity to the existing procedures is consistent with ISG-04 and with the GALL Report. This is stated in Commitment 20 of Appendix A1.4 and Commitment 18 of Appendix A2.4 of the NMP ALRA. The project team reviewed this enhancement, and finds this enhancement acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

In addition, the applicant states, in a letter dated November 17, 2005, that new procedures and preventive maintenance tasks to implement sprinkler head replacement and/or inspections will be added to its Fire Water System Program. The project team reviewed this enhancement and finds that it is consistent with the GALL Report. On this basis, the project team finds this enhancement acceptable.

In addition, the applicant states, in the NMP ALRA and in a letter dated November 17, 2005, that the enhancement in meeting the GALL Report program element is as follows:

Element: 3: Parameters Monitored/Inspected

Enhancement: Revise applicable existing procedures to ensure that the procedures address the following element:

- Add procedural guidance for performing visual inspections to monitor internal corrosion and detect biofouling. (Commitment 20 for NMP Unit 1 and Commitment 18 for NMP Unit 2)

- Incorporate new procedures and preventive maintenance tasks to implement sprinkler head replacement and/or inspections to meet NFPA 25, Section 5.3.1 (2003 Edition) requirements.
(Commitment 20 for NMP Unit 1 and Commitment 18 for NMP Unit 2)

The GALL Report identifies the following recommendation for the "parameters monitored/inspected" program element associated with the enhancement:

> Loss of material due to corrosion and biofouling could reduce wall thickness of the fire protection piping system and result in system failure. Therefore, the parameters monitored are the system's ability to maintain pressure and internal system corrosion conditions. The NRC GL 89-13, "Service Water System Problems Affecting Safety-Related Equipment" recommends periodic flow testing

of infrequently used loops of the fire water system at the maximum design flow to ensure that the system maintains its intended function.

The applicant states, in the NMP ALRA that an enhancement will be made to add procedural guidance for improving the performance of visual inspections to monitor internal corrosion and detect biofouling for fire protection piping systems. This is stated in Commitment 20 of Appendix A1.4 and Commitment 18 of Appendix A2.4 of the NMP ALRA. The applicant also states, in a letter dated November 17, 2005, that the Fire Water System Program will be enhanced by adding the requirements for procedures and preventive maintenance tasks to implement sprinkler head replacement and/or inspections to meet NFPA 25. The project team reviewed this enhancement and finds that the enhancement will make the applicant's Fire Water System Program consistent with ISG-04 and recommendations of NFPA 25 for non-intrusive inspections. Based on ISG-04, disassembly of piping may not be the most effective method to detect aging effects. Each time the system is opened, oxygen is introduced into the system, which accelerates the potential for general corrosion. ISG-04 recommends a pipe wall thickness evaluation that is non-intrusive, such as volumetric inspection, to detect aging effects. ISG-04 also states that the plant maintenance process may include a visual inspection of the internal surface of the fire protection piping upon each entry to the system for routine or corrective maintenance.

In addition, the applicant states, in a letter dated November 17, 2005, that new procedures and preventive maintenance tasks to implement sprinkler head replacement and/or inspections to meet NFPA 25 will be added to its Fire Water System Program. On this basis, the project team finds that this enhancement is sufficient to manage the aging effects of fire protection piping systems.

The applicant also states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

Element: 4: Detection of Aging Effects

Enhancement: Revise applicable existing procedures to ensure that the procedures address the following elements:

- Add requirements to periodically check the water-based fire protection systems for microbiological contamination. (Commitment 20 for NMP Unit 1 and Commitment 18 for NMP Unit 2)

- Measure fire protection system piping wall thickness using non-intrusive techniques (e.g., volumetric testing) to detect loss of material due to corrosion.
(Commitment 20 for NMP Unit 1 and Commitment 18 for NMP Unit 2)

The GALL Report identifies the following recommendation for the "detection of aging effects" program element associated with the enhancement:

> Fire protection system testing is performed to assure required pressures. Internal inspections of aboveground fire protection piping and the smaller diameter fire suppression piping are performed on system components (when they are disassembled) to identify evidence of loss of material due to corrosion. Repair and replacement actions are initiated as necessary. Continuous system pressure monitoring, periodic system flow testing performed, and internal inspections of aboveground piping are effective means to ensure that corrosion and biofouling are not occurring and the system's intended function is maintained. In addition, general requirements of existing fire protection programs include testing and maintenance of fire detection and suppression systems and surveillance procedures to ensure that fire detectors, as well as fire suppression systems and components, are operable.
>
> Visual inspection of yard fire hydrants performed once every six months ensures timely detection of signs of degradation, such as corrosion. Fire hydrant hose hydrostatic tests, gasket inspections, and fire hydrant flow tests, performed annually, ensure that fire hydrants can perform their intended function and provide opportunities for degradation to be detected before a loss of intended function can occur.
>
> Sprinkler systems are inspected once every refueling outage to ensure that signs of degradation, such as corrosion, are detected in a timely manner.

The applicant states, in the NMP ALRA, that requirements are to be added to periodically check the water-based fire protection systems for microbiological contamination. This is stated in Commitment 20 of Appendix A1.4 and Commitment 18 of Appendix A2.4 of the NMP ALRA. The project team reviewed this enhancement and finds that it is consistent with the GALL Report. On this basis, the project team finds that it is acceptable.

The applicant states, in the NMP ALRA, that measurement of fire protection piping wall thicknesses using non-intrusive techniques (e.g., volumetric testing) will be implemented. This is stated in Commitment 20 of Appendix A1.4 and Commitment 18 of Appendix A2.4 of the NMP ALRA. The project team reviewed this enhancement and finds that it is consistent with ISG-04. The applicant states, in the NMP ALRA, that a requirement to measure fire protection system piping wall thicknesses using non-intrusive techniques is to be implemented to detect loss of material due to corrosion. The ISG-04 recommends that fire protection piping wall thickness evaluations be performed on system components using non-intrusive techniques. The project team finds that the applicant's implementation of requirements to perform wall thickness evaluations will provide further assurance that aging effects on the piping system will be adequately managed. On this basis, the project team finds these enhancements acceptable as such changes to the applicant's program will provide additional assurance that the affects of aging will be adequately managed.

In addition, the applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

Element:	5: Monitoring and Trending
Enhancement:	Revise applicable existing procedures to ensure that the procedures address the following elements:

- C Establish an appropriate means of recording, evaluating, reviewing, and trending the results of visual inspections and volumetric testing.
  (Commitment 20 for NMP Unit 1 and Commitment 18 for NMP Unit 2)

The GALL Report identifies the following recommendation for the “monitoring and trending” program element associated with the enhancement:

> System discharge pressure is monitored continuously. Results of system performance testing are monitored and trended as specified by the NFPA codes and standards. Degradation identified by internal inspection is evaluated.

The applicant states, in the NMP ALRA, that an appropriate means of recording, evaluating, reviewing, and trending the results of visual inspections and volumetric testings is to be established and added to existing procedures. This is stated in Commitment 20 of Appendix A1.4 and Commitment 18 of Appendix A2.4 of the NMP ALRA. The project team reviewed this enhancement and finds that it is consistent with the ISG-04. The establishment of an appropriate means of recording, evaluating, reviewing, and trending the results of visual inspections is consistent with the GALL Report, while the establishment of an appropriate means of recording, evaluating, reviewing, and trending the results of volumetric testing is consistent with the ISG-04. On this basis, the project team finds this enhancement acceptable as such changes to the applicant’s program will provide additional assurance that the effects of aging will be adequately managed.

Furthermore, the applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

Element:	6: Acceptance Criteria
Enhancement:	Revise applicable existing procedures to ensure that the procedures address the following element:

- C Define acceptance criteria for visual inspections and volumetric testing.
  (Commitment 20 for NMP Unit 1 and Commitment 18 for NMP Unit 2)

The applicant states in the NMP ALRA, that enhancements will be completed prior to the period of extended operation.

The GALL Report identifies the following recommendation for the “acceptance criteria” program element associated with the enhancement:

> The acceptance criteria are (a) the ability of a fire protection system to maintain required pressure, (b) no unacceptable signs of degradation observed during visual assessment of internal system conditions, and (c) that no biofouling exists in the sprinkler systems that could cause corrosion in the sprinkler heads.

The applicant states, in the NMP ALRA, that an enhancement will be added to existing procedures for visual inspections and volumetric testing to define acceptance criteria. The project team reviewed this enhancement and finds that it is acceptable. This is stated in Commitment 20 of Appendix A1.4 and Commitment 18 of Appendix A2.4 of the NMP ALRA. The new acceptance criteria implemented will provide specific parameters and criteria in the inspection procedure. This is more specific than those listed in the GALL Report which states that no unacceptable signs of degradation is observed during visual assessment of internal system conditions under the program element “acceptance criteria.” The GALL Report does not include volumetric testing, hence it does not have acceptance criteria for volumetric testing. On this basis, the project team finds this enhancement acceptable as such changes to the applicant’s program will provide additional assurance that the effects of aging will be adequately managed.

2.17.5 Operating Experience

The applicant states, in the NMP ALRA, that it has reviewed both industry and plant-specific operating experience relating to the Fire Water System Program. A review of the corrective action program shows that individual components have experienced various types of non-conformances (e.g., pinhole leaks, pipe wall thinning). Evaluations have demonstrated that no loss of system function would occur.

The applicant also states, in the NMP ALRA, that DERs have been initiated to document conditions discovered while performing Fire Water System Program activities. Internal system leakage and failed surveillance tests were often traced to fouling of valve seating surfaces with sand or silt. Typical resolutions included adding sections of piping to specific flushing procedures or periodic disassembly and cleaning of components.

Furthermore, the applicant states, in the NMP ALRA, that its Fire Water System Program is continually adjusted to account for industry experience and research. As additional operating experience is obtained, lessons learned will be used to adjust this program as needed.

On the basis of its review of the above operating experience at the applicant’s plant and at other nuclear facilities as well as discussions with the applicant’s technical staff, the project team concludes that NMP AMP B2.1.17 adequately manages the aging effects that have been observed at the applicant’s plant.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's Fire Water System Program will adequately manage the aging effects that are identified in the NMP ALRA for which this AMP is credited.

2.17.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the Fire Water System Program in NMP ALRA, Appendix A, Section A1.1.18 for NMP Unit 1 and Section A2.1.18 for NMP Unit 2, respectively, which state that the applicant's Fire Water System Program manages aging of water-based fire protection systems due to loss of material and biofouling. Program activities include periodic maintenance, testing, and inspection of system piping and components containing water (e.g., sprinklers, nozzles, fittings, valves, hydrants, hose stations, and standpipes). Inspection and testing is performed in accordance with the guidance of applicable NFPA Codes and Standards and the NEIL Members' Manual.

In addition, the applicant states, in the NMP ALRA, that enhancements to its Fire Water System Program include the following revisions to existing activities that are credited for license renewal:

C Incorporate inspections to detect and manage loss of material due to corrosion into existing periodic test procedures.

C Specify periodic component inspections to verify that loss of material is being managed.

C Add procedural guidance for performing visual inspections to monitor internal corrosion and detect biofouling.

C Add requirements to periodically check the water-based fire protection systems for microbiological contamination.

C Measure fire protection system piping wall thickness using non-intrusive techniques (e.g., volumetric testing) to detect loss of material due to corrosion.

C Establish an appropriate means of recording, evaluating, reviewing, and trending the results of visual inspections and volumetric testing.

C Define acceptance criteria for visual inspections and volumetric testing.

Furthermore, the applicant states, that enhancements will be completed prior to the period of extended operation.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.17, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.17.7 Conclusion

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the project team has reviewed the enhancements and determined that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.18 FUEL OIL CHEMISTRY PROGRAM (NMP AMP B2.1.18)

In NMP ALRA, Appendix B, Section B2.1.18, the applicant states that NMP AMP B2.1.18, "Fuel Oil Chemistry Program" is an existing plant program that is consistent with GALL AMP XI.M30, "Fuel Oil Chemistry" with exceptions and enhancements.

2.18.1 Program Description

The applicant states, in the NMP ALRA, that this program manages loss of material due to corrosion that may result from introduction of contaminants into the plant's fuel oil tanks. Program activities include (1) sampling and chemical analysis of the fuel oil inventory at the plant; (2) sampling, testing, and analysis of new fuel oil as it is unloaded at the plant; and (3) cleaning and inspection of fuel oil tanks. The applicant's Fuel Oil Chemistry Program is based on maintaining fuel oil quality in accordance with the guidelines of American Society for Testing Materials (ASTM) Standards D975, "Diesel Fuel Oils," D1796, "Standard Test Method for Water and Sediment in Fuel Oils by the Centrifuge Method," D2276, "Standard Test Method for Particulate Contaminant in Aviation Fuel by Line Sampling," and D4057, "Standard Practice for Manual Sampling of Petroleum and Petroleum Products."

2.18.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.18 is consistent with GALL AMP XI.M30, with exceptions and enhancements.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.18, including program basis documents, LR-PBD-U1FOCHEM, "Fuel Oil Chemistry (Unit 1)," and LR-PBD-U2FOCHEM, "Fuel Oil Chemistry (Unit 2)," which provide an assessment of the AMP elements' consistency with GALL AMP XI.M30.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.18 and associated basis documents against GALL AMP XI.M30 for consistency.

The project team reviewed those portions of the Fuel Oil Chemistry Program for which the applicant claims consistency with GALL AMP XI.M30 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's Fuel Oil Chemistry Program provides reasonable assurance that the aging effects/mechanisms of loss of material due to corrosion that may result from introduction of contaminants into the plant's fuel oil tanks will be managed. The project team finds the applicant's Fuel Oil Chemistry Program acceptable because it conforms to the recommended GALL AMP XI.M30, "Fuel Oil Chemistry," with the exceptions and enhancements as described below.

2.18.3 Exceptions to the GALL Report

The applicant states, in the NMP ALRA, that the exceptions to the GALL Report program elements are as follows:

Elements: 3: Parameters Monitored/Inspected
6: Acceptance Criteria

Exceptions: NMP Unit 1 and NMP Unit 2 take exception to using both ASTM D1796 and ASTM D2709, "Standard Test Method for Water and Sediment in Middle Distillate Fuels by Centrifuge" to determine the concentration of water and sediment in the diesel fuel oil tanks. NMP Unit 1 and NMP Unit 2 use only the guidance given in ASTM D1796. These standards are applicable to fuel oils of different viscosities. ASTM D1796 is the standard that applies to the diesel fuel used at NMP Unit 1 and NMP Unit 2.

NMP Unit 1 and NMP Unit 2 take exception to using the modified ASTM D2276, Method A which specifies a pore size of 3.0 μm. NMP Unit 1 and NMP Unit 2 use a filter with a pore size of 0.8 μm as specified in ASTM D2276.

The GALL Report identifies the following recommendations for the program elements associated with the exceptions taken:

Parameters Monitored/Inspected: The AMP monitors fuel oil quality and the levels of water and microbiological organisms in the fuel oil, which cause the loss of material of the tank internal surfaces. The ASTM Standard D4057 is used for guidance on oil sampling. The ASTM Standards D1796 and D2709 are used for determination of water and sediment contamination in diesel fuel. For determination of particulates, modified ASTM D2276, Method A, is used. The modification consists of using a filter with a pore size of 3.0 μm, instead of 0.8 μm. These are the principal parameters relevant to tank structural integrity.

> Acceptance Criteria: The ASTM Standard D4057 is used for guidance on oil sampling. The ASTM Standards D1796 and D2709 are used for guidance on the determination of water and sediment contamination in diesel fuel. Modified ASTM D2276, Method A is used for determination of particulates. The modification consists of using a filter with a pore size of 3.0 µm, instead of 0.8 µm.

In regard to the first exception, the project team finds that the applicant is using the standard recommended by the GALL Report and one that the applicant states is appropriate for the viscosity of the fuel oil in use at the site. Based on the audit and review, the project team finds the use of ASTM D1796 acceptable because it is the appropriate testing procedure for the fuel oil in use at NMP Units 1 and 2. The project team finds that the applicant's use of a filter pore size of 0.8 microns instead of the 3.0 micron pore size recommended by the modified ASTM D2276, Method A to be conservative when monitoring the presence of particulates in the fuel oil. Based on the conservative selection of the pore filter size, the project team finds this exception to be acceptable. On this basis, the project team finds these exceptions acceptable.

The applicant also states, in the NMP ALRA, that the exception to the GALL Report program element is as follows:

> Element: 4: Detection of Aging Effects
> Exception: NMP Unit 1 and NMP Unit 2 take exception to multilevel sampling in the diesel fuel oil tanks. The physical configuration of the fuel oil tanks does not allow a representative fuel oil sample to be taken at multiple levels.

The GALL Report identifies the following recommendation for the "detection of aging effects" program element associated with the exception taken:

> Degradation of the diesel fuel oil tank cannot occur without exposure of the tank internal surfaces to contaminants in the fuel oil, such as water and microbiological organisms. Compliance with diesel fuel oil standards in Item 3, above, and periodic multilevel sampling provide assurance that fuel oil contaminants are below unacceptable levels. Internal surfaces of tanks that are drained for cleaning are visually inspected to detect potential degradation. However, corrosion may occur at locations in which contaminants may accumulate, such as a tank bottom, and an ultrasonic thickness measurement of the tank bottom surface ensures that significant degradation is not occurring.

During the audit and review, the applicant clarified that the measurements are taken at approximately six inches from the tank bottom. The tanks are also periodically drained and cleaned to alleviate the build-up of water or sediment. Because the sample is being taken from near the bottom where the water and sediment would accumulate, the project team finds this sample at this location a conservative representation of the whole tank contents. On this basis, the project team finds this exception acceptable.

The applicant further states, in the NMP ALRA, that the exception to the GALL Report program element is as follows:

Element: 5: Monitoring and Trending
Exception: NMP Unit 1 and NMP Unit 2 take exception to periodically sampling the diesel fuel oil day tanks. These small tanks do not have a provision for sampling. Per Technical Specification Surveillance testing, the lower portion of the diesel fuel oil is drained quarterly in NMP Unit 1, and monthly in NMP Unit 2. This exception has been accepted in NUREG-1796, Dresden and Quad Cities Safety Evaluation Report.

The GALL Report identifies the following recommendation for the "monitoring and trending" program element associated with the exception taken:

> Water and biological activity or particulate contamination concentrations are monitored and trended at least quarterly. Based on industry operating experience, quarterly sampling and analysis of fuel oil provide for timely detection of conditions conducive to corrosion of the internal surface of the diesel fuel oil tank before the potential loss of its intended function.

During the audit and review, the applicant clarified that these were small tanks with the diesel fire pump day tank being approximately 275 gallons and the emergency diesel fuel oil day tank being approximately 400 gallons. In addition, per Technical Specification Surveillance testing, the lower portion of the diesel fuel oil in these tanks is drained back to the larger storage tanks. This is to be done quarterly for NMP Unit 1 and monthly for NMP Unit 2. Any water in the fuel oil would then be detected during the surveillance of the bulk storage tanks. Based upon a review of this information, the project team finds that the diesel fuel oil in the diesel fuel oil day tanks is periodically sampled when drained back to the larger storage tank. On this basis, the project team finds this exception acceptable.

2.18.4 Enhancements

The applicant states, in the NMP ALRA, that the enhancements in meeting the GALL Report program elements are as follows:

Elements: 1: Scope of Program
2: Preventive Actions
3: Parameters Monitored/Inspected
4: Detection of Aging Effects
5: Monitoring and Trending
Enhancements: Revise applicable existing procedures to ensure that the procedures address the following elements:

- Incorporate periodic tests for microbiological organisms at NMP Unit 1.

- Provide guidelines for the appropriate use of biocides, corrosion inhibitors, and/or fuel stabilizers to maintain fuel oil quality.
  (Commitment 21 for NMP Unit 1 and Commitment 19 for NMP Unit 2)

- Add a requirement to sample the NMP Unit 2 diesel fuel oil storage tanks for water and sediment at least quarterly per the ASTM standard.
  (Commitment 19 for NMP Unit 2)

In a letter dated November 17, 2005, the applicant deleted the first enhancement which was to "incorporate periodic tests for microbiological organisms at NMP Unit 1." This was deleted because this test is currently being performed and therefore the enhancement is not needed.

The GALL Report identifies the following recommendations for the program elements associated with the enhancements:

> Scope of Program: The program is focused on managing the conditions that cause general, pitting, and microbiologically influenced corrosion (MIC) of the diesel fuel tank internal surfaces. The program serves to reduce the potential of exposure of the tank internal surface to fuel oil contaminated with water and microbiological organisms.
>
> Preventive Actions: The quality of fuel oil is maintained by additions of biocides to minimize biological activity, stabilizers to prevent biological breakdown of the diesel fuel, and corrosion inhibitors to mitigate corrosion.
>
> Parameters Monitored/Inspected: The AMP monitors fuel oil quality and the levels of water and microbiological organisms in the fuel oil, which cause the loss of material of the tank internal surfaces.
>
> Detection of Aging Effects: Degradation of the diesel fuel oil tank cannot occur without exposure of the tank internal surfaces to contaminants in the fuel oil, such as water and microbiological organisms. Compliance with diesel fuel oil standards in Item 3, above, and periodic multilevel sampling provide assurance that fuel oil contaminants are below unacceptable levels.
>
> Monitoring and Trending: Water and biological activity or particulate contamination concentrations are monitored and trended at least quarterly. Based on industry operating experience, quarterly sampling and analysis of fuel oil provide for timely detection of conditions conducive to corrosion of the internal surface of the diesel fuel oil tank before the potential loss of its intended function.

Based on a review of these enhancements, the project team finds that they are consistent with the GALL Report recommendations and are therefore acceptable. On this basis, the project team finds this enhancement acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

The applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program elements is as follows:

Elements:	2: Preventive Actions 4: Detection of Aging Effects
Enhancement:	Revise applicable existing procedures to ensure that the procedures address the following elements:

- Add requirements to periodically inspect the interior surfaces of the NMP Unit 1 emergency diesel fuel oil tanks and diesel fire pump fuel oil day tank, and the NMP Unit 2 fuel oil tanks for evidence of significant degradation, including a specific requirement that the tank bottom thickness be determined.
  (Commitment 21 for NMP Unit 1 and Commitment 19 for NMP Unit 2)

In a letter dated November 17, 2005, the applicant deleted the "diesel fire pump fuel oil day tank" from this enhancement. This was declared as an exception in the NMP ALRA and is evaluated by the project team in Section 2.18.3 of this audit and review report.

The GALL Report identifies the following recommendations for the program elements associated with the enhancement:

> Preventive Actions: Periodic cleaning of a tank allows removal of sediments, and periodic draining of water collected at the bottom of a tank minimizes the amount of water and the length of contact time. Accordingly, these measures are effective in mitigating corrosion inside diesel fuel oil tanks.
>
> Detection of Aging Effects: Internal surfaces of tanks that are drained for cleaning are visually inspected to detect potential degradation. However, corrosion may occur at locations in which contaminants may accumulate, such as a tank bottom, and an ultrasonic thickness measurement of the tank bottom surface ensures that significant degradation is not occurring.

Based on a review of this enhancement, the project team finds that it is consistent with the GALL Report and therefore acceptable. On this basis, the project team finds this enhancement acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

The applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

Element: 5: Monitoring and Trending
Enhancement: Revise applicable existing procedures to ensure that the procedures address the following elements:

C Add a requirement for quarterly trending of particulate contamination analysis results.
(Commitment 21 for NMP Unit 1 and Commitment 19 for NMP Unit 2)

In a letter dated November 17, 2005, the applicant added the following to the "monitoring and trending" and the "parameters monitored and inspected" program elements to the "program elements affected."

C An enhancement for quarterly trending of water and sediment (NMP Unit 1 and Unit 2).

C An enhancement for periodic opening of the diesel fire pump fuel oil day tank drain (NMP Unit 1).

C An enhancement for removal of water, if found (NMP Unit 1 and Unit 2).

The GALL Report identifies the following recommendation for the "monitoring and trending" program element associated with the enhancement:

> Water and biological activity or particulate contamination concentrations are monitored and trended at least quarterly. Based on industry operating experience, quarterly sampling and analysis of fuel oil provide for timely detection of conditions conducive to corrosion of the internal surface of the diesel fuel oil tank before the potential loss of its intended function.

Based on a review of these enhancements, the project team finds that it is consistent with the GALL Report and therefore is acceptable. On this basis, the project team finds this enhancement acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

The GALL Report identifies the following recommendation for the "parameters monitored/inspected" program element associated with the enhancements:

> The AMP monitors fuel oil quality and the levels of water and microbiological organisms in the fuel oil, which cause the loss of material of the tank internal surfaces. The ASTM Standard D4057 is used for guidance on oil sampling. The ASTM Standards D1796 and D2709 are used for determination of water and sediment contamination in diesel fuel. For determination of particulates, modified ASTM D2276, Method A, is used. The modification consists of using a filter with a pore size of 3.0 μm, instead of 0.8 μm. These are the principal parameters relevant to tank structural integrity.

The enhancement for periodic opening of the diesel fire pump fuel oil day tank drain (NMP Unit 1) supports the exception taken by the applicant in regard to periodically sampling the diesel fuel oil day tanks which was evaluated by the project team in Section 2.18.3 of this audit and review report. Based on review of the remaining two new enhancements, the project team finds that they are consistent with the GALL Report and therefore acceptable. On this basis, the project team finds this enhancement acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

The applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

> Element: 6: Acceptance Criteria
> Enhancement: Revise applicable existing procedures to ensure that the procedures address the following elements:
>
> C Ensure acceptance criteria are specified in the implementing procedures for the applicable indications of potential degradation.
> (Commitment 21 for NMP Unit 1 and Commitment 19 for NMP Unit 2)

The GALL Report identifies the following recommendation for the "acceptance criteria" program element associated with the enhancements:

> The ASTM Standard D4057 is used for guidance on oil sampling. The ASTM Standards D1796 and D2709 are used for guidance on the determination of water and sediment contamination in diesel fuel. Modified ASTM D 2276, Method A is used for determination of particulates. The modification consists of using a filter with a pore size of 3.0 μm, instead of 0.8 μm.

In the NMP ALRA Program Description for NMP AMP B2.1.18, the applicant states that the Fuel Oil Chemistry Program is based on maintaining fuel oil quality in accordance with ASTM Standards D975, D1796, D2276 and D4057. This enhancement is to ensure that the acceptance criteria are specified in the implementing procedures. Based on a review of this information, the project team finds that this is consistent with the GALL Report and therefore acceptable. On this basis, the project team finds this enhancement acceptable as such changes to the applicant's program will provide additional assurance that the effects of aging will be adequately managed.

2.18.5 <u>Operating Experience</u>

The applicant states, in the NMP ALRA, that it has reviewed both industry and plant-specific operating experience related to its Fuel Oil Chemistry Program. Review of plant-specific operating experience revealed several incidents where contaminants (e.g., water, particulates) were detected through Fuel Oil Chemistry Program examinations. Corrective actions included contamination removal and system/component cleaning. However, there have been no instances of fuel oil system component failures at NMP attributed to contamination.

In addition, the applicant states, in the NMP ALRA, that its Fuel Oil Chemistry Program is continually adjusted to account for industry experience and research. As additional operating experience is obtained, lessons learned will be used to adjust this program as needed.

Based on a review of the applicant's operating experience, the project team finds evidence that the fuel oil is periodically sampled and, when acceptance limits are exceeded, appropriate corrective actions have been taken. The project team finds that the applicant's Fuel Oil Chemistry Program is effective in managing the aging effects/mechanisms of loss of material due to the presence of contaminants.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

During the initial audit and review (August 9, 2004 through August 13, 2004), the project team requested that the applicant provide examples of the tank inspections for verification of the effectiveness of the program and state if any aging effects/mechanisms were identified. The applicant, in its response, stated that the most recent emergency diesel generator (EDG) tank inspections performed under N1-MPM-EGF-10Y001, "Diesel Generator Fuel Oil Storage Tank Cleaning" and N2-MPM-EGF-10Y001, "Diesel Generator Fuel Oil Storage Tank Cleaning" generated normal results. The applicant concludes that initial ultrasound test of the Unit 2 fuel oil tanks yielded no degradation of the tank wall below minimums. Ultrasound test of the NMP Unit 1 tank has not yet been implemented. The project team reviewed these reports and other documentation (Attachment 5 to this audit and review report) and concludes that no aging effects/mechanisms of the fuel tanks were detected.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's Fuel Oil Chemistry Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.18.6 UFSAR and USAR Supplements

The applicant provides its UFSAR Supplement for the Fuel Oil Chemistry Program in NMP ALRA, Appendix A, Section A1.1.20 for NMP Unit 1, which states that the Fuel Oil Chemistry Program manages loss of material due to corrosion that may result from introduction of contaminants into the plant's fuel oil tanks. Program activities include (1) sampling and chemical analysis of the fuel oil inventory at the plant, (2) sampling, testing, and analysis of new fuel oil as it is unloaded at the plant, and (3) cleaning and inspection of fuel oil tanks. The applicant's Fuel Oil Chemistry Program is based on maintaining fuel oil quality in accordance with the guidelines of ASTM Standards D975, D1796, D2276, and D4057.

The applicant further states, in the NMP ALRA, that enhancements to its Fuel Oil Chemistry Program include the following revisions to existing activities that are credited for license renewal:

- Incorporate periodic tests for microbiological organisms.
- Add a requirement for quarterly trending of particulate contamination analysis results.
- Add requirements to periodically inspect the interior surfaces of the emergency diesel generator fuel oil tanks and diesel fire pump fuel oil day tank for evidence of significant degradation, including a requirement that the tank bottom thickness be determined.
- Provide guidelines for the appropriate use of biocides, corrosion inhibitors, and fuel stabilizers to maintain fuel oil quality.
- Ensure acceptance criteria are specified in the implementing procedures for the applicable indications of potential degradation.

In a letter dated November 17, 2005, the applicant has identified the following changes to the NMP ALRA. First, the enhancement listed above to incorporate periodic microbiological organisms was deleted. Second the following additional enhancements were included in Section A1.1.20:

- An enhancement for quarterly trending of water and sediment
- An enhancement for periodic opening of the diesel fire pump fuel oil day tank drain
- An enhancement for removal of water, if found

The applicant provides its USAR Supplement for the Fuel Oil Chemistry Program in NMP ALRA, Appendix A, Section A2.1.20 for NMP Unit 2, which states that the Fuel Oil Chemistry Program manages loss of material due to corrosion that may result from introduction of contaminants into the plant's fuel oil tanks. Program activities include (1) sampling and chemical analysis of the fuel oil inventory at the plant, (2) sampling, testing, and analysis of new fuel oil as it is unloaded at the plant, and (3) cleaning and inspection of fuel oil tanks. The applicant's Fuel Oil Chemistry Program is based on maintaining fuel oil quality in accordance with the guidelines of ASTM Standards D975, D1796, D2276, and D4057.

In addition, the applicant states, in the NMP ALRA, that enhancements to its Fuel Oil Chemistry Program include the following revisions to existing activities that are credited for license renewal:

- Add a requirement for quarterly trending of particulate contamination analysis results.

- Add requirements to periodically inspect the fuel oil tanks for evidence of significant degradation, including a requirement that the tank thickness be determined.

- Provide guidelines for the appropriate use of biocides, corrosion inhibitors, and fuel stabilizers to maintain fuel oil quality.

- Add a requirement to sample the diesel fuel oil storage tanks for water and sediment at least quarterly per the ASTM standard.

- Ensure acceptance criteria are specified in the implementing procedures for the applicable indications of potential degradation.

In a letter dated November 17, 2005, the applicant has identified the following changes to the NMP ALRA. Namely, the following additional enhancements were included in Section A2.1.20:

- Add a enhancement for quarterly trending of water and sediment.

- Add a enhancement for removal of water, if found.

Furthermore, the applicant states, in the NMP ALRA, that enhancements will be completed prior to the period of extended operation.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.18, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.18.7 Conclusion

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, the project team has reviewed the exceptions and the associated justifications and determined that the AMP, with the exceptions is adequate to manage the aging effects/mechanisms for which it is credited. Also, the project team has reviewed the enhancements and determined that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.19 ONE-TIME INSPECTION PROGRAM (NMP AMP B2.1.20)

In NMP ALRA, Appendix B, Section B2.1.20, the applicant states that NMP AMP B2.1.20, "One-Time Inspection Program," is a new plant program that is consistent with GALL AMP XI.M32, "One-Time Inspection."

2.19.1 Program Description

The applicant states, in the NMP ALRA, that this program is a new program that manages aging effects/mechanisms with potentially long incubation periods for susceptible components within the scope of license renewal. Program activities include visual, volumetric, and other established inspection techniques consistent with industry practice to provide a means of verifying that an aging effect/mechanism is either (1) not occurring, or (2) progressing so slowly that it has a negligible effect on the intended function of the structure or component. The program also provides measures for verifying the effectiveness of existing AMPs. If a one-time inspection reveals an aging effect/mechanism requiring management, an evaluation is required to determine the ability of the affected component to perform its intended function(s) during the period of extended operation and any appropriate corrective action.

The applicant also states, in the NMP ALRA, that for stagnant or low flow areas in treated-water systems, the One-Time Inspection Program will determine the effectiveness of NMP AMP B2.1.2, "Water Chemistry Control Program" in managing the effects of aging. A representative sample will be selected from structures and components grouped on the basis of common characteristics such as materials of construction, fabrication process, operating environment, or aging effects/mechanisms. The sample size will be selected such that it encompasses the most susceptible components. Similar considerations will be used to select inspection samples; (1) for components that have an aging effect/mechanism requiring management that is not expected to occur; or (2) for components where the aging effect/mechanisms is occurring very slowly.

In addition, the applicant states in the NMP ALRA, that for Class 1 piping less than four inches in diameter (nominal pipe size) that is directly connected to the reactor coolant pressure boundary, the One-Time Inspection Program will determine if cracking is occurring. Selection of components for inspection will be based on factors such as piping geometry, piping size, and flow conditions. Inspections will use existing non-destructive evaluation practices. If a flaw is detected, appropriate additional examinations will be performed using methods currently employed for similar components within the scope of NMP AMP B2.1.1, "ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program."

The applicant states, in the NMP ALRA, that selective leaching is also part of the One-Time Inspection Program. It is an aging effect/mechanism that occurs very slowly, and NMP has identified potentially susceptible components in various systems. The process for identifying the population of potentially affected components will be based upon common characteristics of the components, such as material of construction, fabrication process, operating environment, and aging effects/mechanisms. From the selected population, a sample size will be determined to provide a 90 percent confidence that 90 percent of the population does not have the degradation mechanism present. This terminology and methodology are consistent with EPRI TR-107514, “Age-Related Degradation Inspection Method and Determination.” Inspection techniques may include a one-time visual inspection and hardness measurement.

Finally, the applicant states in the NMP ALRA, that its One-Time Inspection Program will be implemented prior to the period of extended operation.

2.19.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.20 is consistent with GALL AMP XI.M32.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.20, including program basis document, LR-PBD-OTINSP, “One-Time Inspection,” which provides an assessment of the AMP elements' consistency with GALL AMP XI.M32.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.20 and associated basis documents against GALL AMP XI.M32 for consistency.

The project team reviewed those portions of the One-Time Inspection Program for which the applicant claims consistency with GALL AMP XI.M32 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant’s One-Time Inspection Program provides reasonable assurance that potential aging effects/mechanisms with long incubation periods will be adequately managed, if required during the period of extended operation. The project team finds the applicant’s One-Time Inspection Program acceptable because it conforms to the recommended GALL AMP XI.M32, “One-Time Inspection.”

2.19.3 Exceptions to the GALL Report

None

2.19.4 Enhancements

None

2.19.5 Operating Experience

The applicant states, in the NMP ALRA, that its One-Time Inspection Program is a new program at NMP; therefore, no programmatic operating experience is available. As operating experience is obtained, lessons learned will be used to adjust this program as needed.

The project team recognizes that the corrective action program, which captures internal and external plant operating experience issues, will ensure that operating experience is reviewed and incorporated in the future to provide objective evidence to support the conclusion that the effects of aging are adequately managed.

2.19.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the One-Time Inspection Program in NMP ALRA, Appendix A, Section A1.1.28 for NMP Unit 1 and Section A2.1.28 for NMP Unit 2, respectively, which state that the One-Time Inspection Program is a new program that manages aging effects/mechanisms with potentially long incubation periods for susceptible components within the scope of license renewal. Program activities include visual, volumetric, and other established inspection techniques consistent with industry practice to provide a means of verifying that an aging effect/mechanism is either (1) not occurring, or (2) progressing so slowly that it has a negligible effect on the intended function of the structure or component. The program also provides measures for verifying the effectiveness of existing AMPs. This program is a new program that will be implemented prior to the period of extended operation.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.20, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.19.7 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR and USAR Supplements for this program, the project team finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.20 SELECTIVE LEACHING OF MATERIALS PROGRAM (NMP AMP B2.1.21)

In NMP ALRA, Appendix B, Section B2.1.21, the applicant states that NMP AMP B2.1.21, “Selective Leaching of Materials Program,” is a new plant program that is consistent with GALL AMP XI.M33, “Selective Leaching of Materials.”

2.20.1 Program Description

The applicant states, in the NMP ALRA, that this program is a new program that manages aging of components susceptible to selective leaching. The potentially susceptible components include valve bodies, valve bonnets, pump casings, and heat exchanger components in various systems.

In addition, the applicant states, in the NMP ALRA, that implementation of its Selective Leaching of Materials Program is discussed in the program description for NMP AMP B2.1.20, “One-Time Inspection Program.”

2.20.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.21 is consistent with GALL AMP XI.M33.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.21, including program basis document, LR-PBD-SLEACH, “Selective Leaching of Materials,” which provides an assessment of the AMP elements' consistency with GALL AMP XI.M33.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.21 and associated basis documents against GALL AMP XI.M33 for consistency.

The project team reviewed those portions of the Selective Leaching of Materials Program for which the applicant claims consistency with GALL AMP XI.M33 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant’s Selective Leaching of Materials Program provides reasonable assurance that selective leaching will be adequately managed during the period of extended operation. The project team finds the applicant’s Selective Leaching of Materials Program acceptable because it conforms to the recommended GALL AMP XI.M33, “Selective Leaching of Materials.”

2.20.3 Exceptions to the GALL Report

None

2.20.4 Enhancements

None

2.20.5 Operating Experience

The applicant states, in the NMP ALRA, that its Selective Leaching of Materials Program is implemented through its One-Time Inspection Program. However, the applicant has had plant-specific operating experience with selective leaching.

During the audit and review, the project team reviewed the operating experience in the program basis document for the applicant’s Selective Leaching of Materials Program and interviewed the applicant's technical staff. On the basis of its review, the project team determines that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's Selective Leaching of Materials Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.20.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the Selective Leaching of Materials Program in NMP ALRA, Appendix A, Section A1.1.33 for NMP Unit 1 and Section A2.1.33 for NMP Unit 2, respectively, which state that the Selective Leaching of Materials Program is a new program that manages aging of components susceptible to selective leaching. The potentially susceptible components include valve bodies, valve bonnets, pump casings, and heat exchanger components in various systems. This program will be implemented through the applicant's One Time Inspection Program prior to the period of extended operation.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.21, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.20.7 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR and USAR Supplements for this program, the project team finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.21 BURIED PIPING AND TANKS INSPECTION PROGRAM (NMP AMP B2.1.22)

In NMP ALRA, Appendix B, Section B2.1.22, the applicant states that NMP AMP B2.1.22, "Buried Piping and Tanks Inspection Program," is a new plant program that is consistent with GALL AMP XI.M34, "Buried Piping and Tanks Inspection" program.

2.21.1 Program Description

The applicant states, in the NMP ALRA, that this program will manage the aging effects/mechanisms on the external surfaces of carbon steel, low-alloy steel, and cast iron components (e.g., tanks, piping) that are buried in soil. Program activities will include visual inspections of external coatings and wrappings to detect damage and degradation. Periodicity of inspections will be based on plant operating experience and opportunities for inspection due to maintenance. If an opportunistic inspection does not occur within the first ten years of extended operation, NMP will excavate a representative sample for the purpose of inspection.

2.21.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.22 is consistent with GALL AMP XI.M34.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.22, including program basis document, LR-PBD-BURIED, "Buried Piping and Tanks Inspection Program (Units 1 and 2)," which provides an assessment of the AMP elements' consistency with GALL AMP XI.M34.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.22 and associated basis documents against GALL AMP XI.M34 for consistency.

In NMP ALRA Section B2.1.22 and the original LRA Section B2.1.22, the applicant states that its Buried Piping and Tanks Inspection Program is a new program that will manage the aging effects/mechanisms on the external surfaces of carbon steel, low-alloy steel, and cast iron components that are buried in soil. However, GALL AMP XI.M.34 states that the program manages the effects of corrosion on the pressure-retaining capacity of buried carbon steel piping and tanks. During the initial audit and review, the project team asked the applicant to explain how aging effects/mechanisms of cast iron and low-alloy components will be managed, e.g., how selective leaching for cast iron will be detected and managed. The applicant responded that low alloy steel and malleable cast iron are in the same material group as carbon steel with similar aging effects requiring management (AERM). Selective leaching is an AERM for gray cast iron and it will be diagnosed by visual inspection and hardness measurement of selected samples.

The project team finds the applicant's response acceptable. Low alloy steel and malleable cast iron have similar aging effects/mechanisms as carbon steel and selective leaching for cast iron components will be discovered by hardness testing.

The following sentence has been added to NMP ALRA Section B2.1.22, Buried Piping and Tanks Inspection Program, under the program description (Page B2-51): "If an opportunistic inspection does not occur within the first ten years of extended operation, NMPNS will excavate a representative sample for the purpose of inspection." The applicant was asked to explain why the program description in the NMP ALRA for its Buried Piping and Tanks Inspection Program was only revised to address the possible need for focused inspections for the first 10-year period of extended operation and not also the possible need for focused inspections for the 10-year period prior to extended operation. The applicant responded that its Buried Piping and Tanks Inspection Program was incomplete. The NMP ALRA will be amended to address the need for possible focused inspections during the 10 year period prior to extended operation.

In a letter dated December 1, 2005, the applicant states that Sections A1.1.6, A2.1.7, and B2.1.22, under the program description, of the NMP ALRA will be revised to read as follows:

> The Buried Piping and Tanks Inspection Program is a new program that will manage the aging effects/mechanisms on the external surfaces of carbon steel, low-alloy steel, and cast iron components (e.g. tanks, piping) that are buried in soil. Program activities will include visual inspections of external coatings and wrappings to detect damage and degradation. Prior to entering the period of extended operation, NMP will verify that there has been at least one opportunistic or focused inspection within the past ten years. Upon entering the period of extended operation, NMP will perform a focused inspection within ten years, unless an opportunistic inspection occurred within this ten year period. All credited inspections will be performed in areas with the highest likelihood of corrosion problems, and in areas with a history of corrosion problems.

Sections A1.1.6 and A2.1.7 will have the following additional last sentence:

> This program will be implemented prior to the period of extended operation.

The project team finds the applicant's response acceptable. With the clarification statements added above by the applicant to the NMP ALRA to perform focused inspections as needed 10 years prior and 10 years after license extension, the applicant's Buried Piping and Tank Inspection Program is now consistent with Element 4 of GALL AMP XI.M34, although not specifically required.

The project team reviewed those portions of the Buried Piping and Tanks Inspection Program for which the applicant claims consistency with GALL AMP XI.M34 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's Buried Piping and Tanks Inspection Program provides reasonable assurance that the aging effects/mechanisms on the external surfaces of carbon steel, low-alloy steel, and cast iron components (e.g., tanks, piping) that are buried in soil will be properly managed for the period of extended operation. The project team finds the applicant's Buried Piping and Tanks Inspection Program acceptable because it conforms to the recommended GALL AMP XI.M34, "Buried Piping and Tanks Inspection."

2.21.3 Exceptions to the GALL Report

None

2.21.4 Enhancements

None

2.21.5 Operating Experience

The applicant states, in the NMP ALRA, that its Buried Piping and Tanks Inspection Program is a new program; therefore, no programmatic operating experience is available. As additional operating experience is obtained, lessons learned will be used to adjust this program as needed.

The project team reviewed the operating experience provided in the NMP ALRA and program basis document (however, only information about related plant-specific and industry experience was available), and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's Buried Piping and Tanks Inspection Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.21.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the Buried Piping and Tanks Inspection Program in NMP ALRA, Appendix A, Section A1.1.6 for NMP Unit 1 and Section A2.1.6 for NMP Unit 2, respectively, which state (after modification as discussed in section 2.21.2 above) that the Buried Piping and Tanks Inspection Program is a new program that will manage the aging effects/mechanisms on the external surfaces of carbon steel, low-alloy steel, and cast iron components (e.g. tanks, piping) that are buried in soil. Program activities will include visual inspections of external coatings and wrappings to detect damage and degradation. Prior to entering the period of extended operation, the applicant will verify that there has been at least one opportunistic or focused inspection within the past ten years. Upon entering the period of extended operation, the applicant will perform a focused inspection within ten years, unless an opportunistic inspection occurred within this ten year period. All credited inspections will be performed in areas with the highest likelihood of corrosion problems, and in areas with a history of corrosion problems. This program will be implemented prior to the period of extended operation.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.22, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR supplement table and as required by 10 CFR 54.21(d).

2.21.7 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR and USAR Supplements for this program, the project team finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.22 ASME SECTION XI INSERVICE INSPECTION (SUBSECTION IWE) PROGRAM (NMP AMP B2.1.23)

In NMP ALRA, Appendix B, Section B2.1.23, the applicant states that NMP AMP B2.1.23, "ASME Section XI Inservice Inspection (Subsection IWE) Program," is an existing plant program that is consistent with GALL AMP XI.S1, "ASME Section XI, Subsection IWE Program," with an exception.

2.22.1 Program Description

The applicant states, in the NMP ALRA, that this program manages the aging effects/mechanisms due to (1) corrosion of carbon steel components comprising the NMP Unit 1 and NMP Unit 2 containment pressure boundaries; and (2) degradation of NMP Unit 1 and NMP Unit 2 containment pressure-retaining polymers. The program activities include visual examinations, with limited surface or volumetric examinations when augmented examination is required. The applicant states in its program basis document, LR-PBD-IWE, "ASME Section XI, Subsection IWE (Units 1 and 2)," that its program is implemented in accordance with 10 CFR 50.55a and the ASME Section XI IWE guidance. ASME Section XI IWE specifies the examination requirements for steel containments (Class MC) and the steel liners of concrete containments (Class CC) including their integral attachments.

The applicant states, in its program basis document, that the ASME Section XI Inservice Inspection (Subsection IWE) Program defines the ASME Code Class MC boundaries subject to examination and testing, including the containment structure and connecting penetrations, appurtenances and parts which form the containment leak-tight boundary. Examinations include all accessible interior and exterior surfaces of Class MC components, parts, and appurtenances, including integral attachments, bolting and dissimilar metal welds. NMP Unit 1 components subject to examination and testing include:

Drywell Shell
Suppression Pool (Torus)
Drywell Head Assembly of Mechanical Piping Penetrations
Penetration Sleeves
Penetration Sleeves of Electrical Penetrations
Emergency Escape Hatch
Personnel Air Lock
Equipment Access Hatch
Drywell Vent System
Drywell Head Access Hatch
Suppression Pool Access Hatches

NMP Unit 2 components subject to examination and testing include:

Drywell Liner
Drywell Floor Liner
Suppression Chamber Liner
Base Mat Liner
Drywell Head Assembly
Penetration Sleeves of the Thermally Hot Penetrations
Sleeves of the Electrical Penetrations
Sleeves for the Instrument Penetrations
Escape Airlock
Combination Personnel Air Lock and Equipment Hatch
Equipment Hatch
CRD Removal Hatch
Drywell Vent System
Suppression Pool Access Hatch

2.22.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.23 is consistent with GALL AMP XI.S1, with an exception.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.23, including program basis document, LR-PBD-IWE, "ASME Section XI, Subsection IWE (Units 1 and 2)," which provides an assessment of the AMP elements' consistency with GALL AMP XI.S1.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.23 and associated basis documents against GALL AMP XI.S1 for consistency.

During the audit and review, the project team asked the applicant to explain why there is an identified enhancement in NMP ALRA Section B2.1.23 for its ASME Section XI Inservice Inspection (Subsection IWE) Program with no affected program elements listed. The applicant stated that the reason that there are no elements identified is that the enhancement shown is not an enhancement that is required to ensure consistency with the GALL Report. It is an enhancement to the program that has been adopted as a function of the applicant's response to an NRC request early in the application review period. To avoid confusion with the specialized definition of enhancement in terms of being consistent with the GALL Report, changes will be incorporated into the NMP ALRA.

In a letter dated December 1, 2005, the applicant states that the first sentence in the second paragraph in NMP ALRA Section A1.1.2 has the word "enhanced" changed to "improved" with the following sentence added at the end of this paragraph: "This improvement is not required for consistency with the GALL but is an activity NMP is adopting to ensure consistency with industry practice." The same change is made to Section A2.1.2 in the NMP ALRA. In NMP AMP B2.1.23 under the enhancement paragraph, a new first paragraph of "None" is added. The following sentence is added to the beginning of the subsequent second paragraph: "The following improvement is not required for consistency with the GALL but is an activity NMP is adopting to ensure consistency with industry practice." The last sentence of this paragraph is replaced with the following sentence: "This improvement will be implemented prior to entry into the period of extended operation." Also, the statement "and requires enhancements to be consistent with others," is deleted from the GALL Report consistency section of NMP AMP B2.1.23.

The project team finds the applicant's response acceptable. With the clarification statements made by the applicant above, there is no enhancement required to the applicant's ASME Section XI Inservice Inspection (Subsection IWE) Program to make it consistent with the GALL Report.

The project team reviewed those portions of the ASME Section XI Inservice Inspection (Subsection IWE) Program for which the applicant claims consistency with GALL AMP XI.S1 and finds that they are consistent with this GALL Report AMP. Furthermore, the project team concludes that the applicant's ASME Section XI Inservice Inspection (Subsection IWE) Program provides reasonable assurance that the aging effects/mechanisms from conditions such as corrosion of carbon steel components comprising the NMP containment pressure boundaries; and the degradation of NMP Unit 1 and NMP Unit 2 containment pressure-retaining polymers, will be properly managed for the period of extended operation. The project team finds the applicant's ASME Section XI Inservice Inspection (Subsection IWE) Program acceptable because it conforms to the recommended GALL AMP XI.S1, "ASME Section XI, Subsection IWE Program," with the exception described below.

2.22.3 Exceptions to the GALL Report

The applicant states, in the NMP ALRA, that the exception to the GALL Report program elements is as follows:

Elements: 3: Parameters Monitored/ Inspected
4: Detection of Aging Effects
5: Monitoring and Trending
6: Acceptance Criteria

Exception: The GALL Report program elements identify both the ASME 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda as the applicable editions for the NMP Unit 1 and NMP Unit 2 Application for Renewed Operating License Appendix B - Aging Management Program ASME Section XI IWE, as approved in 10 CFR 50.55a. The NMP IWE Inservice Inspection Program complies with the ASME Section XI, 1998 Edition with no Addenda for NMP.

The GALL Report identifies the following recommendations for the program elements associated with the exception taken:

Parameters Monitored/Inspected: Table IWE-2500-1 specifies seven categories for examination. The categories, parts examined, and examination methods are presented in the following table (see the GALL Report for table). The first six examination categories (E-A through E-G) constitute the ISI requirements of IWE. Table IWE-2500-1 references the applicable section in IWE-3500 that identifies the aging effects/mechanisms that are evaluated. The parameters monitored or inspected depend on the particular examination category. For Examination Category E-A, as an example, metallic surfaces (without coatings) are examined for evidence of cracking, discoloration, wear, pitting, excessive corrosion, arc strikes, gouges, surface discontinuities, dents and other signs of surface irregularities. For Examination Category E-D, seals, gaskets, and moisture barriers are examined for wear, damage, erosion, tear, surface cracks, or other defects that may violate the leak-tight integrity.

Detection of Aging Effects: The frequency and scope of examinations specified in 10 CFR 50.55a and Subsection IWE ensure that aging effects/mechanisms would be detected before they would compromise the design-basis requirements. As indicated in IWE-2400, inservice examinations and pressure tests are performed in accordance with one of two inspection programs, A or B, on a specified schedule. Under Inspection Program A, there are four inspection intervals (at 3, 10, 23, and 40 years) for which 100% of the required examinations must be completed. Within each interval, there are various periods for which a certain percentage of the examinations are to be performed to reach 100% at the end of that interval. In addition, a general visual examination is performed once each inspection period. After 40 years of operation, any future examinations will be performed in accordance with Inspection Program B. Under Inspection Program B, starting with the time the plant is placed into service, there is an initial inspection interval of 10 years and successive inspection intervals of 10 years each, during which 100% of the required examinations are to be completed. An expedited examination of containment is required by 10 CFR 50.55a in which an inservice (baseline) examination specified for the first period of the first inspection interval for containment is to be performed by September 9, 2001. Thereafter, subsequent examinations are performed every 10 years from the baseline examination. Regarding the extent of examination, all accessible surfaces receive a visual examination such as General Visual, VT-1, or VT-3. IWE-1240 requires augmented examination (Examination Category E-C) of containment surface areas subject to degradation. A VT-1 visual examination is performed for areas accessible from both sides, and volumetric (ultrasonic thickness measurement) examination is performed for areas accessible from only one side.

Monitoring and Trending: With the exception of inaccessible areas, all surfaces are monitored by virtue of the examination requirements on a scheduled basis. When component examination results require evaluation of flaws, evaluation of areas of degradation, or repairs, and the component is found to be acceptable for continued service, the areas containing such flaws, degradation, or repairs shall be reexamined during the next inspection period, in accordance with Examination Category E-C. When these reexaminations reveal that the flaws, areas of degradation, or repairs remain essentially unchanged for three consecutive inspection periods, these areas no longer require augmented examinations in accordance with Examination Category E-C. IWE-2430 specifies that (a) examinations performed during any one inspection that reveal flaws or areas of degradation exceeding the acceptance standards are to be extended to include an additional number of examinations within the same category approximately equal to the initial number of examinations, and (b) when additional flaws or areas of degradation that exceed the acceptance standards are revealed, all of the remaining examinations within the same category are to be performed to the extent specified in Table IWE-2500-1 for the inspection interval. Alternatives to these examinations are provided in 10 CFR 50.55a(b)(2)(ix)(D).

Acceptance Criteria: IWL-3000 provides acceptance criteria for components of steel containments and liners of concrete containments. Table IWE-3410-1 presents criteria to evaluate the acceptability of the containment components for service following the preservice examination and each inservice examination. This table specifies the acceptance standard for each examination category. Most of the acceptance standards rely on visual examinations. Areas that are suspect require an engineering evaluation or require correction by repair or replacement. For some examinations, such as augmented examinations, numerical values are specified for the acceptance standards. For the containment steel shell or liner, material loss exceeding 10% of the nominal containment wall thickness, or material loss that is projected to exceed 10% of the nominal containment wall thickness before the next examination, are documented. Such areas are to be accepted by engineering evaluation or corrected by repair or replacement in accordance with IWE-3122.

The applicant states, in the NMP ALRA that the GALL Report program description for this AMP identifies both the 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda as the applicable editions for the NMP Unit 1 and NMP Unit 2 ASME Section XI Inservice Inspection (Subsection IWE) Program, as approved in 10 CFR 50.55a. The applicant's IWE Inservice Inspection Program complies with ASME Section XI, 1998 Edition with no Addenda. Although differences exist between code years, the applicant's IWE Inservice Inspection Program complies with an edition of Section XI approved by the NRC for use at NMP. Implementation of guidance according to this later code edition meets the intent of the GALL Report description.

The project team noted that the NRC previously found this exception acceptable because the code of record for NMP is a later version of the ASME Code than the one identified by the GALL Report. The use of the 1998 Edition of the ASME Code was found acceptable in a letter from the U.S. Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated August 17, 2000 with the Subject: Nine Mile Point Nuclear Station, Unit Nos. 1 and 2 - Relief From the Requirements of 10 CFR 50.55a Related to Containment Inspection (TAC Nos. MA7116, MA7117, and MA7118). The project team also noted that the applicant's ASME code of record for ASME Section XI Inservice Inspection (Subsection IWE) is valid for a 10-year inspection interval under the current licensing basis. At present, an ASME Section XI Inservice Inspection (Subsection IWE) program is approved for use on an ASME Code 10-year ISI interval specific basis. However, the applicant will have to request approval to use the ASME Section XI Inservice Inspection (Subsection IWE) program for the specific intervals during the period of extended operation in accordance with 10 CFR 50.55a, 12 months prior to each interval. Therefore, the project team finds that the ASME Section XI Code Edition in effect, as referenced in 10 CFR 50.55a, 12 months prior to each inspection interval of extended operation, is acceptable for the period of extended operation. On this basis, the project team finds this exception acceptable.

2.22.4 Enhancements

None

2.22.5 Operating Experience

The applicant states, in the NMP ALRA, that it has reviewed both industry and plant-specific operating experience relating to the IWE Inservice Inspection Program. Review of plant-specific operating experience revealed few noteworthy discrepancies and no age-related equipment failures. Deficiencies discovered by recent IWE Inservice Inspection Program examinations included damage to the NMP Unit 1 torus equipment hatch, damage to the NMP Unit 1 drywell dome manway hatch sealing surface, minor corrosion on the NMP Unit 1 drywell dome sealing surface, and minor corrosion on the NMP Unit 2 drywell liner. These indications were investigated and corrected. The applicant continuously reviews industry operating experience to determine its applicability to the plant and adjusts inspection plans accordingly. Plant-specific operating experience is reviewed and trended; findings are documented, reviewed, and resolved; corrective actions are taken; and mitigative actions to limit aging initiated.

The project team also reviewed the summary of specific operating experience provided in the applicant's program basis document for its ASME Section XI Inservice Inspection (Subsection IWE) Program. The review indicated that the applicant's ASME Section XI Inservice Inspection (Subsection IWE) Program is effective in identifying age-related degradation, implementing repairs, and maintaining the integrity of the containment pressure boundaries; and the NMP Units 1 and 2 containment pressure-retaining polymers.

During the initial audit and review (August 9 through August 13, 2004), NMP Unit 1 plant maintenance records revealed that there have been only a few noteworthy DERs written and no age-related component failures as a result of IWE inspections since the inception of the program. Historically, the deficiencies were limited to such things as damage of the torus equipment hatch, damage to the drywell dome manway hatch sealing surface, corrosion of the drywell liner, and minor damage or corrosion on the drywell dome sealing surface. None of these deficiencies resulted in loss of intended function due to age-related degradation. This provides assurance that containment pressure boundary degradation has not been occurring since the inception of the program.

In addition, during the initial audit and review, NMP Unit 2 plant maintenance records revealed that there has been only one noteworthy DER written and no age-related component failures as a result of IWE inspections since the inception of the program. In 2000, minor corrosion was discovered and removed from the drywell liner, with no loss of integrity. This provides assurance that containment pressure boundary degradation has not been occurring since the inception of the program.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's ASME Section XI Inservice Inspection (Subsection IWE) Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.22.6 UFSAR and USAR Supplements

The applicant provided its UFSAR Supplement for the ASME Section XI Inservice Inspection (Subsection IWE) Program in NMP ALRA, Appendix A, Section A1.1.2 for NMP Unit 1, which states that the ASME Section XI Inservice Inspection (Subsection IWE) Program (referred to herein as the IWE Inservice Inspection Program) manages aging effects/mechanisms due to (1) corrosion of carbon steel components comprising the containment pressure boundary; and (2) degradation of containment pressure-retaining polymers. Program activities include visual examinations, with limited surface or volumetric examinations when augmented examination is required. The IWE Inservice Inspection Program is based on the 1998 Edition of the ASME Boiler and Pressure Vessel Code, Section XI (Subsection IWE) for containment inservice inspection with plant-specific exceptions approved by the NRC. This is an exception to the evaluation in the GALL Report (which covers ASME Section XI requirements from both the 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda). (Reference Section 2.22.2 of this audit and review report for changes and additions to the following sentences) The NMP Unit 1 ASME Section XI Inservice Inspection (Subsection IWE) Program is being enhanced to add an augmented VT-1 visual examination of the NMP Unit 1 containment penetration bellows. This inspection will be performed using enhanced techniques qualified for detecting SCC per NUREG-1611, "Aging Management of Nuclear Power Plant Containments for License Renewal," Table 2, Item 12.

In addition, the applicant provides its USAR Supplement for the ASME Section XI Inservice Inspection (Subsection IWE) Program in NMP ALRA, Appendix A, Section A2.1.2 for NMP Unit 2, which states that the ASME Section XI Inservice Inspection (Subsection IWE) Program (referred to herein as the IWE Inservice Inspection Program) manages aging effects/mechanisms due to (1) corrosion of carbon steel components comprising the containment pressure boundary; and (2) degradation of containment pressure-retaining polymers. Program activities include visual examinations, with limited surface or volumetric examinations when augmented examination is required. The IWE Inservice Inspection Program is based on the 1998 Edition of the ASME Boiler and Pressure Vessel Code, Section XI (Subsection IWE) for containment inservice inspection with plant-specific exceptions approved by the NRC. This is an exception to the evaluation in the GALL Report (which covers ASME Section XI requirements from both the 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda). (Reference Section 2.22.2 of this audit and review report for changes and additions to the following sentences) The NMP Unit 2 ASME Section XI Inservice Inspection (Subsection IWE) Program is being enhanced to add an augmented VT-1 visual examination of the NMP Unit 2 containment penetration bellows. This inspection will be performed using enhanced techniques qualified for detecting SCC per NUREG-1611, Table 2, Item 12.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.23, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.22.7 Conclusion

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, the project team has reviewed the exception and the associated justifications and determined that the AMP, with the exception is adequate to manage the aging effects/mechanisms for which it is credited. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.23 ASME SECTION XI INSERVICE INSPECTION (SUBSECTION IWL) PROGRAM [Unit 2 Only] (NMP AMP B2.1.24)

In NMP ALRA, Appendix B, Section B2.1.24, the applicant states that NMP AMP B2.1.24, "ASME Section XI Inservice Inspection (Subsection IWL) Program (Unit 2 Only)," is an existing plant program that is consistent with GALL AMP XI.S2, "ASME Section XI, Subsection IWL Program," with an exception.

2.23.1 Program Description

The applicant states, in the NMP ALRA, that this program manages the aging of concrete in the NMP Unit 2 containment wall, base mat, and drywell floor. The program activities include general visual examinations of all accessible concrete surface areas, with provisions for detailed visual examinations when deterioration and distress of suspect areas are detected. The applicant states in its program basis document, LR-PBD-IWL, "ASME Section XI, Subsection IWL (Unit 2)," that the program is implemented in accordance with 10 CFR 50.55a and the ASME Section XI IWL guidance. IWL specifies the examination requirements for reinforced and prestressed concrete containments (Class CC).

The applicant states in its program basis document that the NMP Unit 2 primary containment is a reinforced concrete structure that consists of a drywell chamber located above a suppression chamber and does not use pre-stressed tendons; and therefore, the unbonded post-tensioning inspection requirements of ASME Section XI IWL do not apply.

Furthermore, in the NMP ALRA, the applicant states that this program applies to concrete elements of BWR Mark II and III containment structures. This program does not apply to NMP Unit 1 since it is a BWR Mark I containment.

2.23.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.24 is consistent with GALL AMP XI.S2, with an exception.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.24, including program basis document, LR-PBD-IWL, "ASME Section XI, Subsection IWL (Unit 2)," which provides an assessment of the AMP elements' consistency with GALL AMP XI.S2.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.24 and associated basis documents against GALL AMP XI.S2 for consistency.

During the audit and review, the project team asked the applicant to explain why in NMP AMP B2.1.24 (Page B2-54), under the Consistency paragraph, IWE is shown in the first sentence instead of IWL. The applicant responded that this was a typographical error and the IWE should have been IWL.

In a letter dated December 1, 2005, the applicant states that in NMP AMP B2.1.24 (Page B2-54), under the Consistency paragraph, the typographical error IWE is changed to IWL.

The project team finds the applicant's response acceptable. With the correction of IWE to IWL the sentence will agree with the NMP AMP described in NMP AMP B2.1.24.

The project team reviewed those portions of the ASME Section XI Inservice Inspection (Subsection IWL) Program (Unit 2 only) for which the applicant claims consistency with GALL AMP XI.S2 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's ASME Section XI Inservice Inspection (Subsection IWL) Program (Unit 2 only) provides reasonable assurance that the aging effects/mechanisms from conditions such as cracks, spalling, pop-outs, erosion and abrasion of concrete containment surfaces, will be properly managed for the period of extended operation. The project team finds the applicant's ASME Section XI Inservice Inspection (Subsection IWL) Program (Unit 2 only) acceptable because it conforms to the recommended GALL AMP XI.S2, "ASME Section XI, Subsection IWL Program," with the exception described below.

2.23.3 Exceptions to the GALL Report

The applicant states, in the NMP ALRA, that the exception to the GALL Report program elements is as follows:

Elements:	3: Parameters Monitored/Inspected 4: Detection of Aging Effects 5: Monitoring and Trending 6: Acceptance Criteria
Exception:	The GALL Report program elements identify both the ASME 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda as the applicable editions for the NMP Unit 2 Application for Renewed Operating License Appendix B - Aging Management Program ASME Section XI IWL, as approved in 10 CFR 50.55a. The NMP IWL Inservice Inspection Program complies with ASME Section XI, 1998 Edition with no Addenda.

The GALL Report identifies the following recommendations for the program elements associated with the exception taken:

Parameters Monitored/Inspected: Table IWL-2500-1 specifies two categories for examination of concrete surfaces: Category L-A for all concrete surfaces and Category L-B for concrete surfaces surrounding tendon anchorages. Both of these categories rely on visual examination methods. Concrete surfaces are examined for evidence of damage or degradation, such as concrete cracks. IWL-2510 specifies that concrete surfaces are examined for conditions indicative of degradation, such as those defined in American Concrete Institute (ACI) 201.1R-77, “Guide for Making a Condition Survey of Concrete in Service.”

Detection of Aging Effects: The frequency and scope of examinations specified in 10 CFR 50.55a and Subsection IWL ensure that aging effects/mechanisms would be detected before they would compromise the design-basis requirements. The frequency of inspection is specified in IWL-2400. Concrete inspections are performed in accordance with Examination Category L-A. Under Subsection IWL, inservice inspections for concrete and unbonded post-tensioning systems are required at one, three, and five years following the structural integrity test. Thereafter, inspections are performed at five-year intervals.

Monitoring and Trending: Except in inaccessible areas, all concrete surfaces are monitored on a regular basis by virtue of the examination requirements.

Acceptance Criteria: IWL-3000 provides acceptance criteria for concrete containments. For concrete surfaces, the acceptance criteria rely on the determination of the “Responsible Engineer” (as defined by the ASME Code) regarding whether there is any evidence of damage or degradation sufficient to warrant further evaluation or repair. The acceptance criteria are qualitative; guidance is provided in IWL-2510, which references ACI 201.1R-77 for identification of concrete degradation. IWL-2320 requires that the Responsible Engineer be a registered professional engineer experienced in evaluating the inservice condition of structural concrete and knowledgeable of the design and construction codes and other criteria used in design and construction of concrete containments.

The applicant states, in the NMP ALRA that the GALL Report program description for this AMP identifies both the 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda as the applicable editions for the its ASME Section XI Inservice Inspection (Subsection IWL) Program, as approved in 10 CFR 50.55a. The applicant's IWL Inservice Inspection Program complies with the ASME Section XI, 1998 Edition with no Addenda. Although differences exist between code years, the applicant's IWL Inservice Inspection Program complies with an edition of Section XI approved by the NRC for use at NMP. Implementation to this later code edition meets the intent of the GALL Report description.

The project team noted that the NRC previously found this exception acceptable because the code of record for NMP Unit 2 is a later version of the ASME Code than the one identified by the GALL Report. The use of the 1998 Edition of the ASME Code was found acceptable in a letter from the U.S. Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated August 17, 2000 with the Subject: Nine Mile Point Nuclear Station, Unit Nos. 1 and 2 - Relief From the Requirements of 10 CFR 50.55a Related to Containment Inspection (TAC Nos. MA7116, MA7117, and MA7118). The project team also noted that the applicant's ASME code of record for ASME Section XI Inservice Inspection (Subsection IWL) is valid for a 10-year inspection interval under the current licensing basis. At present, an ASME Section XI Inservice Inspection (Subsection IWL) program is approved for use on an ASME Code 10-year ISI interval specific basis. However, the applicant will have to request approval to use the ASME Section XI Inservice Inspection (Subsection IWL) program for the specific intervals during the period of extended operation in accordance with 10 CFR 50.55a, 12 months prior to each interval. Therefore, the project team finds that the ASME Section XI Code Edition in effect, as referenced in 10 CFR 50.55a, 12 months prior to each inspection interval of extended operation, is acceptable for the period of extended operation. On this basis, the project team finds this exception acceptable.

2.23.4 Enhancements

None

2.23.5 Operating Experience

The applicant states, in the NMP ALRA, that it has reviewed both industry and plant-specific operating experience relating to its IWL Inservice Inspection Program. Review of plant-specific operating experience revealed no DERs written as a result of IWL Inservice Inspection Program inspections since program inception. The plant continuously reviews industry operating experience to determine its applicability to NMP and adjusts inspection plans accordingly. Plant-specific operating experience is reviewed and trended; findings are documented, reviewed, and resolved; corrective actions are taken; and mitigative actions to limit aging initiated.

During the initial audit and review, the project team reviewed operating experience for the applicant's ASME Section XI Inservice Inspection (Subsection IWL) Program (Unit 2 only). The review indicated that the applicant's ASME Section XI Inservice Inspection (Subsection IWL) Program (Unit 2 only) is effective in maintaining the integrity of the containment concrete with processes in place to identify age-related degradation and implement repairs.

The project team also reviewed the summary of specific operating experience provided in the applicant's program basis document for its ASME Section XI Inservice Inspection (Subsection IWL) Program (Unit 2 Only). The review indicated that there have been no DERs written as a result of IWL inspections since the inception of the program. This provides assurance that containment degradation has not been occurring since the inception of the program.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's ASME Section XI Inservice Inspection (Subsection IWL) Program (Unit 2 Only) will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.23.6 USAR Supplement

The applicant provided its USAR Supplement for the ASME Section XI Inservice Inspection (Subsection IWL) Program (Unit 2 only) in NMP ALRA, Appendix A, Section A2.1.4 which states that the ASME Section XI Inservice Inspection (Subsection IWL) Program (referred to herein as the IWL Inservice Inspection Program) manages aging of concrete in the NMP Unit 2 containment wall, base mat, and drywell floor. Program activities include general visual examinations of all accessible concrete surface areas, with provisions for detailed visual examinations when deterioration and distress of suspect areas is detected. The applicant's IWL Inservice Inspection Program is based on the 1998 Edition of the ASME Boiler and Pressure Vessel Code, Section XI (Subsection IWL) for containment inservice inspection with plant-specific exceptions approved by the NRC. This is an exception to the GALL Report (which covers ASME Section XI requirements from both the 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda).

The project team reviewed the USAR Supplement for NMP AMP B2.1.24, found that it was consistent with the GALL Report, and determined that it provides an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.23.7 Conclusion

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, the project team has reviewed the exception and the associated justifications and determined that the AMP, with the exception is adequate to manage the aging effects/mechanisms for which it is credited. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the USAR Supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.24 ASME SECTION XI INSERVICE INSPECTION (SUBSECTION IWF) PROGRAM (NMP AMP B2.1.25)

In NMP ALRA, Appendix B, Section B2.1.25, the applicant states that NMP AMP B2.1.25, "ASME Section XI Inservice Inspection (Subsection IWF) Program," is an existing plant program that is consistent with GALL AMP XI.S3, "ASME Section XI, Subsection IWF Program," with an exception.

2.24.1 Program Description

The applicant states, in the NMP ALRA, that this program manages the aging effects/mechanisms of carbon steel components and piping supports, including ASME Class MC supports, due to general corrosion and wear. The program activities include visual examination to determine the general mechanical and structural conditions of components and their supports. The applicant states in its program basis document, LR-PBD-IWF, "ASME Section XI, Subsection IWF (Units 1 and 2)," that the program is implemented in accordance with 10 CFR 50.55a and the ASME Section XI IWF guidance. IWF specifies the examination requirements for Class 1, 2, 3 and MC component supports. The applicant conducts examinations in accordance with alternate examination requirements of ASME Code Case N–491-1, "Alternative Rules for Examination of Class 1, 2, 3 and MC Component Supports of Light-Water Cooled Power Plants, Section XI, Division 1 as approved for use in Regulatory Guide 1.147, Inservice Inspection Code Case Applicability, ASME Section XI, Division 1."

The applicant states in its program basis document, that the component supports selected for examinations are the supports of those components that are required to be examined under IWB, IWC, IWD or IWE. Examinations are conducted to determine the general mechanical and structural condition of components and their supports and include the monitoring of verification of clearances, settings, physical displacements, loose or missing parts, debris, corrosion, cracking, wear, erosion, deformation, misalignment, or loss of integrity at bolted or welded connections.

2.24.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.25 is consistent with GALL AMP XI.S3, with an exception.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.25, including program basis document, LR-PBD-IWF, "ASME Section XI, Subsection IWF (Units 1 and 2)," which provides an assessment of the AMP elements' consistency with GALL AMP XI.S3.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.25 and associated basis documents against GALL AMP XI.S3 for consistency.

The project team reviewed those portions of the ASME Section XI Inservice Inspection (Subsection IWF) Program for which the applicant claims consistency with GALL AMP XI.S3, and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's ASME Section XI Inservice Inspection (Subsection IWF) Program provides reasonable assurance that the aging effects/mechanisms from conditions such as general corrosion and wear of carbon steel components and piping supports, will be properly managed for the period of extended operation. The project team finds the applicant's ASME Section XI Inservice Inspection (Subsection IWF) Program acceptable because it conforms to the recommended GALL AMP XI.S3, "ASME Section XI, Subsection IWF Program," with the exceptions described below.

2.24.3 Exceptions to the GALL Report

The applicant states, in the NMP ALRA, that the exception to the GALL Report program elements is as follows:

Elements: 1: Scope of Program
3: Parameters Monitored/Inspected
6: Acceptance Criteria

Exception: The GALL Report program elements identify the ASME 1989 Edition through the 1995 Edition and Addenda through the 1996 Addenda as the applicable editions for the NMP Unit 1 and NMP Unit 2 Application for Renewed Operating License Appendix B - Aging Management Program ASME Section XI IWF, as approved in 10 CFR 50.55a. The NMP IWE Inservice Inspection Program complies with ASME Section XI, 1989 Edition with no Addenda for NMP.

The GALL Report identifies the following recommendations for the program elements associated with the exception taken:

Scope of Program: (Per ASME 1989 Edition through the 1995 Edition and Addenda through the 1996 Addenda) For Class 1 piping and component supports, Subsection IWF (1989 Edition) refers to Subsection IWB for the inspection scope and schedule. According to Table IWB-2500-1, only 25% of nonexempt supports are subject to examination. Supports exempt from examination are the supports for piping systems that are exempt from examination, according to pipe diameter or service. The same supports are inspected in each 10-year inspection interval. For Class 2, 3, and MC piping and component supports, Subsection IWF (1989 Edition) refers to Subsections IWC, IWD, and IWE for the inspection scope and schedule. According to Table IWC-2500-1, 7.5% of nonexempt supports are subject to examination for Class 2 systems. The same supports are inspected in each 10-year inspection interval. No specific numerical percentages are identified in Subsections IWD and IWE for Class 3 and Class MC, respectively.

Starting with the 1990 Addenda to the 1989 Edition, the scope of Subsection IWF was revised. The required percentages of each type of nonexempt support subject to examination were incorporated into Table IWF-2500-1. The revised percentages are 25% of Class 1 nonexempt piping supports, 15% of Class 2 nonexempt piping supports, 10% of Class 3 nonexempt piping supports, and 100% of supports other than piping supports (Class 1, 2, 3, and MC). For pipe supports, the total sample consists of supports from each system (such as main steam, feedwater, residual heat removal), where the individual sample sizes are proportional to the total number of nonexempt supports of each type and function within each system. For multiple components other than piping, within a system of similar design, function, and service, the supports of only one of the multiple components are required to be examined. To the extent practical, the same supports selected for examination during the first inspection interval are examined during each successive inspection interval.

Parameters Monitored/Inspected: (Per ASME 1989 Edition through the 1995 Edition and Addenda through the 1996 Addenda) IWF specifies visual examination (VT-3) of supports. The parameters monitored or inspected include corrosion; deformation; misalignment; improper clearances; improper spring settings; damage to close tolerance machined or sliding surfaces; and missing, detached, or loosened support items. The visual inspection would be expected to identify relatively large cracks. Table IWF-2500-1 (1989 Edition) specifies examination of the following:

(F1.10) Mechanical connections to pressure-retaining components and building structure;
(F1.20) Weld connections to building structure;
(F1.30) Weld and mechanical connections at intermediate joints in multi-connected integral and nonintegral supports;
(F1.40) Clearances of guides and stops, alignment of supports, and assembly of support items;
(F1.50) Spring supports and constant load supports;
(F1.60) Sliding surfaces;
(F1.70) Hot or cold position of spring supports and constant load supports.

Acceptance Criteria: (Per ASME 1989 Edition through the 1995 Edition and Addenda through the 1996 Addenda) The acceptance standards for visual examinations are specified in IWF-3400. In IWF-3410(b)(5), "roughness or general corrosion which does not reduce the load bearing capacity of the support" is given as an example of a "non-relevant condition," which requires no further action. IWF-3410(a) identifies the following conditions as unacceptable: (i) deformations or structural degradations of fasteners, springs, clamps, or other support items; (ii) missing, detached, or loosened support items; (iii) arc strikes, weld spatter, paint, scoring, roughness, or general corrosion on close tolerance machined or sliding surfaces; (iv) improper hot or cold positions of spring supports and constant load supports; (v) misalignment of supports; (vi) improper clearances of guides and stops.

Identification of unacceptable conditions triggers an expansion of the inspection scope, in accordance with IWF-2430, and reexamination of the supports requiring corrective actions during the next inspection period, in accordance with IWF-2420(b).

The applicant states, in the NMP ALRA, that the NRC previously found this exception acceptable because the code of record regarding IWF inspections for NMP is the 1989 version of the ASME Code, which was found acceptable in two letters from the U.S. Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated October 5, 2000 and March 3, 2000. The subject of the October 5, 2000 letter was: Nine Mile Point Nuclear Station, Unit No. 1 - Reliefs for the Third 10-Year Inservice Inspection Program Plan, Revision 1 (TAC No. MA7129). The subject of the March 3, 2000 letter was: Nine Mile Point Nuclear Station, Unit No. 2 - Reliefs for the Second 10-Year Inservice Inspection Program Plan, Revision 1 (TAC No. MA6273). The project team also noted that the applicant's ASME code of record for ASME Section XI Inservice Inspection (Subsection IWF) is valid for a 10-year inspection interval under the current licensing basis. At present, an ASME Section XI Inservice Inspection (Subsection IWF) program is approved for use on an ASME Code 10-year ISI interval specific basis. However, the applicant will have to request approval to use the ASME Section XI Inservice Inspection (Subsection IWF) Program for the specific intervals during the period of extended operation in accordance with 10 CFR 50.55a, 12 months prior to each interval. Therefore, the project team finds that the ASME Section XI Code Edition in effect, as referenced in 10 CFR 50.55a, 12 months prior to each inspection interval of extended operation, is acceptable for the period of extended operation. On this basis, the project team finds this exception acceptable.

The project team noted that the GALL Report AMP program identifies the ASME 1989 Edition through the 1995 Edition and Addenda through the 1996 Addenda as the applicable editions for the applicant's ASME Section XI Inservice Inspection (Subsection IWF) Program, as approved in 10 CFR 50.55a. The applicant's IWF Inservice Inspection Program complies with ASME Section XI, 1989 Edition with no Addenda. Although differences exist between code years, the applicant's IWF Inservice Inspection Program complies with an edition of Section XI approved by the NRC for use at NMP. Implementation to this code edition meets the intent of the GALL Report description.

2.24.4 Enhancements

None

2.24.5 Operating Experience

The applicant states, in the NMP ALRA, that it has reviewed both industry and plant-specific operating experience relating to its IWF Inservice Inspection Program. Review of plant-specific operating experience revealed no age-related failures of any supports within the scope of the IWF Inservice Inspection Program. The applicant continuously reviews industry operating experience to determine its applicability and adjusts inspection plans accordingly. Plant-specific operating experience is reviewed and trended; findings are documented, reviewed, and resolved; corrective actions are taken; and mitigative actions to limit aging initiated.

The project team also reviewed the summary of specific operating experience provided in the applicant’s program basis document for its ASME Section XI Inservice Inspection (Subsection IWF) Program. Review of the summary indicated that the applicant did not identify any age related ASME Code Class 1, 2, 3, and MC component support failures. During the initial audit and review (August 9 through August 13, 2004), NMP Unit 1 plant maintenance records revealed that there have been no age-related failures of any supports in the program, and internal audits have revealed only administrative deficiencies that did not affect the ability of any support to perform its intended function. One example of a noteworthy DER, which demonstrated the effective inspection techniques in use at NMP Unit 1, is a support that may have lost a degree of freedom from the improper application of paint. Further investigation revealed the support maintained its intended function and there was no degradation related to aging. Other DERs identified documented deficiencies that were discovered and corrected through the site quality assurance and corrective action programs. Therefore, no un-managed age-related degradation was discovered. This provides assurance that support degradation has not been occurring since the inception of the program.

During the initial audit and review, NMP Unit 2 plant maintenance records also revealed that there have been no age-related failures of any supports in the program, and internal audits have revealed only administrative deficiencies that did not affect the ability of any support to perform its intended function. One example of a noteworthy DER demonstrating the effective inspection techniques in use at NMP Unit 2 is a support with a gap between the inner nut and clamp. The pipe clamp bolts were tightened to their original design specification and the support was determined to be operable so there was no loss of intended function. Other DERs identified documented deficiencies that were discovered and corrected through the site quality assurance and corrective action programs. Therefore, no un-managed age-related degradation was discovered. This provides assurance that support degradation has not been occurring since the inception of the program.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant’s technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's ASME Section XI Inservice Inspection (Subsection IWF) Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.24.6 UFSAR and USAR Supplements

The applicant provided its UFSAR Supplement for the ASME Section XI Inservice Inspection (Subsection IWF) Program in NMP ALRA, Appendix A, Section A1.1.3 for NMP Unit 1, which states that its ASME Section XI Inservice Inspection (Subsection IWF) Program (referred to herein as the IWF Inservice Inspection Program) manages aging of carbon steel component and piping supports, including ASME Class MC supports, due to general corrosion and wear. Program activities include visual examination to determine the general mechanical and structural condition of components and their supports. The IWF Inservice Inspection Program is based on the 1989 Edition of the ASME Boiler and Pressure Vessel Code, Section XI (Subsection IWF) for inservice inspection of supports and implements the alternate examination requirements of ASME Code Case N-491-1. These are exceptions to the evaluation in the GALL Report (which covers ASME Section XI requirements from the 1989 Edition through the 1995 Edition and addenda through the 1996 Addenda).

In addition, the applicant provides its USAR Supplement for the ASME Section XI Inservice Inspection (Subsection IWF) program in NMP ALRA, Appendix A, Section A2.1.3 for Unit 2, which states that its ASME Section XI Inservice Inspection (Subsection IWF) Program (referred to herein as the IWF Inservice Inspection Program) manages aging of carbon steel component and piping supports, including ASME Class MC supports, due to general corrosion and wear. Program activities include visual examination determine the general mechanical and structural condition of components and their supports. The IWF Inservice Inspection Program is based on the 1989 Edition of the ASME Boiler and Pressure Vessel Code, Section XI (Subsection IWF) for inservice inspection of supports and implements the alternate examination requirements of ASME Code Case N-491-1. This is an exception to the evaluation in the GALL Report (which covers ASME Section XI requirements from the 1989 Edition through the 1995 Edition and addenda through the 1996 Addenda).

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.25, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.24.7 Conclusion

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, the project team has reviewed the exception and the associated justifications and determined that the AMP, with the exception is adequate to manage the aging effects/mechanisms for which it is credited. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.25 10 CFR 50 APPENDIX J PROGRAM (NMP AMP B2.1.26)

In NMP ALRA, Appendix B, Section B2.1.26, the applicant states that NMP AMP B2.1.26, “10 CFR 50 Appendix J Program,” is an existing plant program that is consistent with GALL AMP XI.S4, “10 CFR 50, Appendix J.”

2.25.1 Program Description

The applicant states, in the NMP ALRA, that this program (referred to herein as the Containment Leak Rate Test [LRT] Program or Appendix J Program) detects degradation of the containment structure and components that comprise the containment pressure boundary, including seals and gaskets. Containment leak rate tests are performed to assure that leakage through the primary containment and systems and components penetrating primary containment does not exceed allowable leakage limits specified in the technical specifications. The program consists of a schedule to conduct Type A, B, and C tests. Type A tests measure the primary reactor containment overall integrated leakage rate, and include visual examinations of the interior and exterior surfaces of the containment for evidence of structural deterioration. Type B tests measure leakage across each pressure-containing or leakage-limiting boundary, including (1) containment penetrations whose design incorporates resilient seals, gaskets, or sealant compounds; (2) piping penetrations fitted with expansion bellows; (3) electrical penetrations fitted with flexible metal seal assemblies; (4) air lock door seals; and (5) doors with resilient seals or gaskets. Type C tests measure the leakage rates for containment isolation valves.

The applicant also states, in the NMP ALRA, that 10 CFR 50, Appendix J provides two options, A and B, either of which can be chosen to meet the requirements of a containment LRT program. Under Option A, all of the testing must be performed on a periodic interval. Option B is a performance-based approach. At NMP, the applicant complies with Option B requirements of 10 CFR 50 Appendix J with plant-specific exceptions approved by the NRC as part of license amendments, and implements the guidelines provided in NRC Regulatory Guide (RG) 1.163, “Performance-Based Containment Leak-Testing Program” and NEI 94-01, “Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50 Appendix J.”

2.25.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.26 is consistent with GALL AMP XI.S4.

The project team interviewed the applicant’s technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.26, including program basis document, LR-PBD-APPJ, “Program Attribute Assessment: Unit 1

10 CFR 50, Appendix J Program and Unit 2 10 CFR 50, Appendix J Program," which provides an assessment of the AMP elements' consistency with GALL AMP XI.S4.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.26 and associated basis documents against GALL AMP XI.S4 for consistency.

The project team reviewed those portions of the 10 CFR 50, Appendix J Program for which the applicant claims consistency with GALL AMP XI.S4 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's 10 CFR 50 Appendix J Program provides reasonable assurance that the program will adequately manage plant aging. The project team finds the applicant's 10 CFR 50, Appendix J Program acceptable because it conforms to the recommended GALL AMP XI.S4, "10 CFR Part 50, Appendix J."

2.25.3 Exceptions to the GALL Report

None

The applicant states, in the NMP ALRA, that in implementing Option B for 10 CFR Appendix J testing, it requested certain exemptions from the requirements of 10 CFR 50 Appendix J and exceptions from certain guidance of NRC Regulatory Guide 1.163. These plant-specific alternatives were approved by the NRC prior to NMP's implementation of Option B. The project team reviewed the NRC issued NMP technical specifications amendments and associated SER which approved the applicant's adoption of Option B with those exceptions (NMP Unit 2 SER, dated August 13, 1996). The applicant states that these exemptions are not considered to be exceptions to the GALL Report program elements. Since these exemptions have no impacts on the program elements, the project team agrees with the applicant's assessment.

2.25.4 Enhancements

None

2.25.5 Operating Experience

The applicant states, in the NMP ALRA, that neither NMP Unit 1 nor NMP Unit 2 has experienced a total leakage rate in the past two refueling outages that was above Containment LRT Program acceptance criteria. The applicant also states that its Containment LRT Program is continually adjusted to account for industry experience and research. As additional operating experience is obtained, lessons learned will be used to adjust this program as needed.

During the audit and review, in response to the project team's inquiry, the applicant stated that no problems have been identified through the corrective action program during the past two refueling outages that affect its Appendix J Program. In March - May, 2004, the applicant's Appendix J Program was appraised to be sound by its own self-assessment and by an external independent organization. The project team noted that the applicant has demonstrated good operating experience in maintaining the integrity of the primary containment boundaries as evidence by the selection of Option B of 10 CFR Part 50, Appendix J leakage testing requirements at established frequencies consistent with plant experience.

The project team sampled several items on the DER list that were associated with the LRT Program and did not identify any items related to the Appendix J Program that would necessitate a change to NMP AMP B2.1.26.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant’s technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

The project team finds that, based on the review of operating history, corrective actions, and self-assessments, the applicant’s 10 CFR Part 50, Appendix J Program is continually monitored and enhanced to incorporate the results of operating experience; as such, it provides an effective means of managing aging associated with the structural integrity and leak tightness of the NMP containments.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant’s 10 CFR 50, Appendix J Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.25.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the 10 CFR 50 Appendix J Program in NMP ALRA, Appendix A, Section A1.1.1 for NMP Unit 1 and Section A2.1.1 for NMP Unit 2, respectively, which state that its 10 CFR 50 Appendix J Program detects degradation of the containment structure and components that comprise the containment pressure boundary, including seals and gaskets. Containment leak rate tests are performed to assure that leakage through the primary containment and systems and components penetrating primary containment does not exceed allowable leakage limits specified in the technical specifications. This program complies with Option B requirements of 10 CFR 50 Appendix J with plant-specific exceptions approved by the NRC as part of license amendments, and implements the guidelines provided in RG 1.163 and NEI 94-01.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.26, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.25.7 Conclusion

On the basis of its audit and review of the applicant’s program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR and USAR Supplements for this AMP, the project team finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.26 MASONRY WALL PROGRAM (NMP AMP B2.1.27)

In NMP ALRA, Appendix B, Section B2.1.27, the applicant states that NMP AMP B2.1.27, “Masonry Wall Program,” is an existing program that is consistent with GALL AMP XI.S5, “Masonry Wall Program.” However, the Masonry Wall Program is implemented by NMP AMP B2.1.28, “Structures Monitoring Program,” with enhancements.

Because the applicant chose to implement its Masonry Wall Program through its Structures Monitoring Program, the project team evaluations are combined with the evaluations provided under the Structures Monitoring Program in Section 2.27 of this audit and review report.

2.26.1 Program Description

The applicant states in the NMP ALRA, that this program manages aging effects/mechanisms to which masonry walls are subjected so that the evaluation basis established for each masonry wall within the scope of license renewal remains valid through the period of extended operation. In addition, the applicant states in its program basis document, LR-PBD-MASONRY, “Masonry Wall Program (Units 1 and 2),” that the program provides for periodic visual inspections, surveys, and examinations of all masonry walls within the scope of license renewal. Program activities are inspection of masonry walls for signs of degradation, including cracking, broken or missing blocks.

The project team noted that since the issuance of NRC IEB 80-11, “Masonry Wall Design,” and NRC IN 87-67, “Lessons Learned from Regional Inspections of Licensee Actions in Response to IE Bulletin 80-11;” the NRC promulgated 10 CFR 50.65, the Maintenance Rule. The masonry walls are monitored under 10 CFR 50.65 (Maintenance Rule) as addressed in NRC RG 1.160, “Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” Nuclear Management and Resources Council (NUMARC) (now NEI) 93-01, “Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” and NEI 96-03, “Guideline for Monitoring the Condition of Structures at Nuclear Power Plants.” These three documents provide guidance for development of licensee-specific programs to monitor the condition of structures and structural components within the scope of the Maintenance Rule, such that there is no loss of structure or structural component intended function. GALL AMP XI.S5 states that masonry walls may be inspected as part of the Structures Monitoring Program conducted for the Maintenance Rule, provided all ten elements for the Masonry Wall Program are addressed in the Structures Monitoring Program. The applicant has elected to include the Masonry Wall Program in its Structures Monitoring Program, as referenced in Section 2.27 of this audit and review report.

2.26.2 Consistency with the GALL Report

Refer to Section 2.27.2 of this audit and review report.

2.26.3 Exceptions to the GALL Report

None

2.26.4 Enhancements

Refer to Section 2.27.4 of this audit and review report.

2.26.5 Operating Experience

Refer to Section 2.27.5 of this audit and review report.

2.26.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the Masonry Wall Program in NMP ALRA, Appendix A, Section A1.1.23 for NMP Unit 1 and Section A2.1.23 for NMP Unit 2, respectively, which state that its Masonry Wall Program manages aging effects/mechanisms so that the evaluation basis established for each masonry wall within the scope of license renewal remains valid through the period of extended operation. The applicant's Masonry Wall Program is based on the structures monitoring requirements of 10 CFR 50.65. The applicant's Masonry Wall Program is implemented by its Structures Monitoring Program for managing specific aging effects/mechanisms.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.27, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.26.7 Conclusion

Refer to Section 2.27.7 of this audit and review report.

2.27 STRUCTURES MONITORING PROGRAM (NMP AMP B2.1.28)

In NMP ALRA, Appendix B, Section, B2.1.28, the applicant states that NMP AMP B2.1.28, "Structures Monitoring Program," is an existing plant program that is consistent with GALL AMP XI.S6, "Structures Monitoring Program," with enhancements.

2.27.1 Program Description

The applicant states, in the NMP ALRA, that this program manages aging of structures, structural components, and structural supports within the scope of licensing renewal. The program provides for periodic visual inspections, surveys, and examination of all safety related buildings (including the primary containment and substructures within the primary containment) and various other buildings within the scope of license renewal. Program activities identify degradation of materials of construction, which include structural steel, concrete, masonry block and sealing materials (Note: NMP Unit 1 wood has been added by the applicant to materials of construction. See Section 2.27.2 below). The majority of these structures and structural support systems are monitored under 10 CFR 50.65 (Maintenance Rule) as addressed in NRC RG 1.160, “Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” NUMARC 93-01, “Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” and NEI 96-03, “Guideline for Monitoring the Condition of Structures at Nuclear Power Plants.” These three documents provide guidance for development of licensee-specific programs to monitor the condition of structures and structural components within the scope of the Maintenance Rule, such that there is no loss of structure or structural component intended function. The remaining structures within the scope of license renewal (such as fire rated assemblies, watertight penetrations and masonry walls in the turbine building and servicewater tunnel) are also monitored to ensure there is no loss of intended function.

The applicant’s Structures Monitoring Program takes no credit for coatings applied to external surfaces of structural members in the determination of the aging effects/mechanisms for the underlying materials.

2.27.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.28 is consistent with GALL AMP XI.S6, with enhancements.

The project team interviewed the applicant’s technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.28, including program basis document, LR-PBD-STRUCMON, “Structures Monitoring Program (Units 1 and 2),” which provides an assessment of the AMP elements’ consistency with GALL AMP XI.S5 and GALL AMP XI.S6. The project team also reviewed program basis document, LR-PBD-MASONRY, “Masonry Wall Program (Units 1 and 2),” since this program is implemented through the Structures Monitoring Program.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.28 and associated basis documents against GALL AMP XI.S5 and GALL AMP XI.S6 for consistency.

During the initial audit and review (August 9 through August 13, 2004), the project team asked the applicant to explain the design of the foundations for its structures within license renewal and if any of these structures have porous concrete subfoundations. In addition, the applicant was asked to explain if any license renewal structures have settlement issues and if there is a site de-watering system.

The applicant stated in response to the project team’s questions, that the foundations for the structures within the scope of license renewal at NMP are reinforced concrete on bedrock. The use of porous concrete sub-foundation construction was not used at NMP. The applicant also responded that settlement is not an aging effect/mechanism at NMP and that there is no site de-watering system at NMP.

GALL AMP XI.S5, under the "detection of aging effects" program element, has the following statement: the frequency of inspection is selected to ensure there is no loss of intended function between inspections. The inspection frequency may vary from wall to wall, depending on the significance of cracking in the evaluation basis. Unreinforced masonry walls that have not been contained by bracing warrant the most frequent inspection, because the development of cracks may invalidate the existing evaluation basis. The applicant states in its Masonry Wall Program basis document in Table 5.0-1 under subattribute 4.3 that the inspection frequency of six years for the unreinforced walls is consistent with the GALL Report. However, this inspection frequency is the same as that for reinforced masonry walls as discussed in the applicant's program basis document.

During the audit and review, the project team asked the applicant to explain how this was consistent with the GALL Report if the inspection frequency for all reinforced, unreinforced, and braced masonry walls within the scope of license renewal was the same. The applicant responded that it will make part of its Masonry Wall Program (as managed by its Structures Monitoring Program) a requirement that unreinforced masonry walls without bracing be inspected more frequently for cracking than reinforced and braced masonry walls.

In a letter dated December 1, 2005, the applicant states that a commitment to enhance the program is added to the NMP ALRA for its Masonry Wall Program (as managed by its Structures Monitoring Program) based on the GALL Report text in the program element, "detection of aging effects." The program enhancement will provide guidance for inspecting NMP Unit 1 unreinforced masonry walls, that are within the scope of license renewal and that do not have bracing, more frequently than the reinforced masonry walls. The NMP ALRA sections affected are A1.1.34, A1.4 and NMP AMP B2.1.28.

The project team finds the applicant's response acceptable. With the commitment made by the applicant above to inspect unreinforced masonry walls more frequently, the applicant's Structural Monitoring Program is now consistent with element 4 of GALL AMP XI.S5.

During the audit and review, the project team noted that the applicant's Structures Monitoring Program basis document listed wood in air as one of the NMP Unit 1 component/commodity groups managed by the program. The applicant was asked to explain why wood was not listed under the program description in NMP ALRA Section A1.1.34 and NMP AMP B2.1.28 as one of the materials of construction that is inspected for degradation by the program. The applicant responded that it would add wood to the list of materials for NMP Unit 1 in the program description paragraph of NMP AMP B2.1.28 and the paragraph in NMP ALRA Section A1.1.34.

In a letter dated December 1, 2005, the applicant states that NMP ALRA Section A1.1.34 is revised by adding NMP Unit 1 wooden structure to the list of materials of construction in the first paragraph. NMP AMP B2.1.28 is revised by adding NMP Unit 1 wooden structure to the list of materials of construction in the first paragraph under the program description.

The project team finds the applicant's response acceptable. With the addition of wood to NMP ALRA Section A1.1.34 and NMP AMP B2.1.28 by the applicant, the applicant's Structures Monitoring Program in the NMP ALRA is now in agreement with the program basis document.

The project team reviewed those portions of the Structures Monitoring Program for which the applicant claims consistency with GALL AMP XI.S5 and GALL AMP XI.S6, and finds that they are consistent with the GALL Report AMPs. Furthermore, the project team concludes that the applicant's Structures Monitoring Program provides reasonable assurance that the aging of materials of construction, which include structural steel, concrete, masonry block, wood and sealing materials, for structures within the scope of license renewal will be properly managed for the period of extended operation. The project team finds the applicant's Structures Monitoring Program acceptable because it conforms to the recommended GALL AMP XI.S5, "Masonry Wall Program," and GALL AMP XI.S6, "Structures Monitoring Program," with enhancements as described below.

2.27.3 Exceptions to the GALL Report

None

2.27.4 Enhancements

The applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program elements is as follows:

Elements:	1: Scope of Program 3: Parameters Monitored/Inspected 4: Detection of Aging Effects 6: Acceptance Criteria
Enhancement:	Expand scope and make revisions to existing activities (i.e., procedures) that are credited for license renewal to ensure the applicable aging effects/mechanisms are discovered and evaluated. (Commitment 26 for NMP Unit 1 and Commitment 24 for NMP Unit 2)

The GALL Report identifies the following recommendations for the program elements associated with the enhancement:

Scope of Program: The applicant specifies the structure/aging effect combinations that are managed by its Structures Monitoring Program.

Parameters Monitored/Inspected: For each structure/aging effect combination, the specific parameters monitored or inspected are selected to ensure that aging degradation leading to loss of intended functions will be detected and the extent of degradation can be determined. Parameters monitored or inspected are to be commensurate with industry codes, standards and guidelines, and are to also consider

> industry and plant-specific operating experience. Although not required, ACI 349.3R-96, “Evaluation of Existing Nuclear Safety-Related Concrete Structures” and ANSI/ASCE 11-90, “Guideline for Structural Condition Assessment of Existing Buildings,” provide an acceptable basis for selection of parameters to be monitored or inspected for concrete and steel structural elements and for steel liners, joints coatings, and waterproofing membranes (if applicable).
>
> Detection of Aging Effects: For each structure/aging effect combination, the inspection methods, inspection schedule, and inspector qualifications are selected to ensure that aging degradation will be detected and quantified before there is loss of intended functions.
>
> Acceptance Criteria: For each structure/aging effect combination, the acceptance criteria are selected to ensure that the need for corrective actions will be identified before loss of intended functions. Acceptance criteria are to be commensurate with industry codes, standards and guidelines, and are to also consider industry and plant-specific operating experience. Although not required, ACI 349.3R-96 provides an acceptable basis for developing acceptance criteria for concrete structural elements, steel liners, joints, coatings, and waterproofing membranes. The plant-specific Structures Monitoring Program is to contain sufficient detail on acceptance criteria to conclude that this program attribute is satisfied.

The applicant states, in the NMP ALRA, that its Structures Monitoring Program will be expanded to include the following activities or components within the scope of license renewal, but which are not currently within the scope of 10 CFR 50.65:

> (a) NMP Unit 2 fire rated assemblies and watertight penetration visual inspections, (b) NMP Unit 2 masonry walls in the turbine building and service water tunnel serving a fire barrier function, and (c) the steel electrical transmission towers required for the station blackout (SBO) and recovery paths for NMP Units 1 and 2.

Also, parameters monitored during structural inspections will be expanded to include those relevant to aging effects/mechanisms identified for structural bolting. In addition, regularly scheduled ground water monitoring will be implemented to ensure that a benign environment is maintained.

The project team finds that with these additional inspections and SCs, the applicant’s Structures Monitoring Program will meet the intent of the program described in GALL AMP XI.S6. The applicant identified commitments to the NRC associated with this enhancement relative to GALL AMP XI.S6. On the basis that these additional structural components will bring the applicant’s program into agreement with GALL AMP XI.S6, the project team finds this enhancement acceptable as such changes to the applicant’s program will provide additional assurance that the effects of aging will be adequately managed.

2.27.5 Operating Experience

The applicant states, in the NMP ALRA, that it has reviewed both industry and plant-specific operating experience relating to its Structures Monitoring Program. Since implementation of inspections under its Structures Monitoring Program, minor cracking has been identified in various concrete structures and slight (but stable) ground water leaks have occurred in some tunnels. However, a review of plant-specific operating experience revealed no cases of structural failure caused by unidentified degradation. Similarly, no structural deficiencies have been identified in flood control structures. The applicant's Structures Monitoring Program is continually adjusted to account for industry experience and research. As additional operating experience is obtained, lessons learned will be used to adjust this program as needed.

The project team also reviewed the summary of specific operating experience provided in the applicant's program basis document for its Structures Monitoring Program. The review indicated that the applicant's Structures Monitoring Program is effective in identifying structural degradation, implementing corrective actions, and trending the parameters for the NMP structures within the scope of license renewal. When degradation has been identified, corrective actions have been implemented to ensure that the integrity of the affected structure is maintained before there is a loss of intended function.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

During the project team's audit and review, NMP Unit 1 and NMP Unit 2 plant maintenance/inspection records revealed that since implementation, the applicant's Structures Monitoring Program has been effective at identifying structural degradation before a loss of intended function occurs.

Minor cracking has been identified in various concrete structures on several DERs. These include:

DER - NM-1991-623 – Closed, "Cracks In PR340 Floor to RB 318 Ceiling"

DER - NM-1992-114 – Closed, "Cracked Concrete"

DER - NM-1993-1789 – Closed, "Masonry Wall Monitoring Walkdown Per Engineering Spec. SDS-001"

DER - NM-1994-173 – Closed, "Cracking in South Wall of Reactor Building on Elevations 281, 298, 318 Columns 6 & 9"

DER - NM-1994-174 – Closed, "Numerous Vertical Cracks in Concrete Turbine Building Wall on North Side Between Columns 7 & 11"

DER - NM-1997-1944 – Closed, "Structural Maintenance Rule Walkdown Deficiencies (MR)"

DER - NM-1997-3392 – Closed, "Structural Maintenance Rule Walkdown Deficiencies (MR)"

DER - NM-1996-1951 – Closed, "Cracking/Shifting Wall"

Also, slight but stable ground water leaks have occurred in some tunnels, as noted in DER - NM-1994-376 – Closed, "Groundwater Inleakage to TB Pipe Tunnel" and DER - NM-1998-159 – Closed, "Groundwater Inleakage into Turbine Bldg. SWP Tunnel Through New Cracks." However, there are no cases of structural failure caused by unidentified degradation. Similarly, no structural deficiencies have been identified in flood control structures.

Since the service water pipe tunnel is susceptible to small wall cracks allowing in-leakage of ground water, the applicant was asked by the project team during the initial audit and review to discuss the results of the latest inspections for the tunnel and how often these inspections were done. The applicant stated, in response to the project team's question, that the repaired areas referenced in DER NM-1998-159 were recently inspected and there continues to be no in-leakage of water in the areas repaired. The frequency of inspections following the repairs has varied. Initially, repair inspections were monthly, then quarterly, then annually. Inspections of the tunnel are now scheduled every refueling outage.

In addition, during the initial audit and review, the project team asked the applicant to explain if there is any rust staining in the tunnel, indicating corrosion of rebar in the concrete, and the basis for not performing any external waterproofing repairs to the tunnel. The applicant responded at the time that inspections of accessible areas adjacent to inaccessible areas can give an indication of the condition of the material in the inaccessible areas. Rust stains have not been identified on the internal surface of the concrete adjacent to the areas of in-leakage through the tunnel concrete walls. Therefore, it is reasonable to conclude that degradation of the reinforcing steel is not occurring. Waterproof coating of the exterior surface of the structure is not required due to successful repairs to water in-leakage paths from the inside of the structure.

Furthermore, during the initial audit and review, the project team asked the applicant to explain the design of the service water pipe tunnel such that if in-leakage of ground water occurred again and the sump pumps failed, how would the flood depth not exceed three inches as discussed in DER NM-1998-159. The applicant stated at the time that the tunnel is sectioned by various curbs and elevations. If the sumps failed in the subject area of the tunnel, in-leakage water would flow over the curb and into another sump.

The applicant was also asked at the time to discuss the latest inspections for the normal switchgear building, service water tunnels and the radwaste building for below grade exterior walls where groundwater in-leakage has also occurred. The applicant stated that the latest inspections have not identified significant water in-leakage for the structures within the scope of license renewal.

It should be noted that based on the initial audit and review, the applicant's Structures Monitoring Program has a provision in its procedures that in the case of buried structures, when inaccessible areas are excavated or exposed, if practical, an inspection of these structures will be performed and included in the program's database.

On the basis of its review of the above industry and plant-specific operating experience, and discussions with the applicant's technical staff, the project team concludes that the applicant's Structures Monitoring Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.27.6 UFSAR and USAR Supplements

The applicant provides its UFSAR Supplement for the Structures Monitoring Program in NMP ALRA, Appendix A, Section A1.1.34 for NMP Unit 1, which states that its Structures Monitoring Program manages aging of structures, structural components, and structural supports within the scope of license renewal. The program provides for periodic visual inspections, surveys, and examination of all safety related buildings (including the primary containment and substructures within the primary containment) and various other buildings within the scope of license renewal. Program activities identify degradation of materials of construction, which include structural steel, concrete, masonry block, sealing materials (and also wood). While not credited for mitigation of aging, protective coatings are also inspected under this program. The applicant's Structures Monitoring Program, which was initially developed to meet the regulatory requirements of 10 CFR 50.65, implements guidance provided in Regulatory Guide 1.160, NUMARC 93-01 and NEI 96-03.

The applicant states, in the NMP ALRA, that enhancements to its Structures Monitoring Program include the following revisions to existing activities that are credited for license renewal:

- Expand the parameters monitored during structural inspections to include those relevant to aging effects/mechanisms requiring management identified for structural bolting.

- Implement regularly scheduled ground water monitoring to ensure that a benign environment is maintained.

- Expand the scope of the program to include the steel electrical transmission towers required for the SBO recovery path that are within the scope of license renewal, but not within the current scope of 10 CFR 50.65.

The applicant also states, in the NMP ALRA, that enhancements will be completed prior to the period of extended operation.

In addition, the applicant provides its USAR Supplement for its Structures Monitoring Program in NMP ALRA, Appendix A, Section A2.1.34 for Unit 2, which states that its Structures Monitoring Program manages aging of structures, structural components, and structural supports within the scope of license renewal. The program provides for periodic visual inspections, surveys, and examination of all safety related buildings (including the containment buildings and substructures within the primary containment) and various other buildings within the scope of license renewal. Program activities identify degradation of materials of construction, which include structural steel, concrete, masonry block, and sealing materials. While not credited for mitigation of aging, protective coatings are also inspected under this program. The applicant's Structures Monitoring Program, which was initially developed to meet the regulatory requirements of 10 CFR 50.65, implements guidance provided in Regulatory Guide 1.160, NUMARC 93-01 and NEI 96-03.

The applicant states, in the NMP ALRA, that enhancements to its Structures Monitoring Program include the following revisions to existing activities that are credited for license renewal:

- Expand the program to include the following activities or components within the scope of license renewal, but not within the current scope of 10 CFR 50.65: (a) NMP Unit 2 fire rated assemblies and watertight penetration visual inspection, (b) NMP Unit 2 masonry walls in the turbine building and service water tunnel serving a fire barrier function, and the steel electrical transmission towers required for the SBO recovery path.

- Expand the parameters monitored during structural inspections to include those relevant to aging effects/mechanisms requiring management identified for structural bolting.

- Implement regularly scheduled ground water monitoring to ensure that a benign environment is maintained.

The applicant also states, in the NMP ALRA, that enhancements will be completed prior to the period of extended operation.

The project team finds the UFSAR and USAR Supplement for NMP Unit 1 and NMP Unit 2, respectively, to be an acceptable summation of the applicant's Structures Monitoring Program.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.28, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.27.7 <u>Conclusion</u>

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. Also, the project team has reviewed the enhancement and determined that the implementation of the enhancement prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.28 NON-EQ ELECTRICAL CABLES AND CONNECTIONS PROGRAM (NMP AMP B2.1.29)

In NMP ALRA, Appendix B, Section B2.1.29, the applicant states that NMP AMP B2.1.29, "Non-EQ Electrical Cables and Connections Program," is a new plant program that is consistent with GALL AMP XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements."

2.28.1 Program Description

The applicant states, in the NMP ALRA, that this program manages aging of cables and connectors within the scope of license renewal exposed to adverse localized temperature, moisture, or radiation environments. Program activities include visual inspections of susceptible cables for evidence of cable and connection jacket surface anomalies. Inspections are conducted at least once every ten years, with the first representative sample of susceptible cables inspected prior to expiration of the current NMP licenses.

2.28.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.29 is consistent with GALL AMP XI.E1.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.29, including program basis document, LR-PBP-ELECT1, "Aging Management Program for Electrical Cables and Connections not Subject to 10 CFR 50.49 Environmental Qualification Requirement," which provides an assessment of the AMP elements' consistency with GALL AMP XI.E1.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.29 and associated basis documents against GALL AMP XI.E1 for consistency.

The project team reviewed those portions of the Non-EQ Electrical Cables and Connections Program for which the applicant claims consistency with GALL AMP XI.E1 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant’s Non-EQ Electrical Cables and Connections Program provides reasonable assurance of aging management of conductor insulation in cables and connections. The project team finds the applicant’s Non-EQ Electrical Cables and Connections Program acceptable because it conforms to the recommended GALL AMP XI.E1, “Non-EQ Electrical Cables and Connections Program.”

2.28.3 Exceptions to the GALL Report

None

2.28.4 Enhancements

None

2.28.5 Operating Experience

The applicant states, in the NMP ALRA, that its Non-EQ Electrical Cables and Connections Program is a new program. As operating experience with this program is obtained, lessons learned will be used to adjust this program as needed.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

In the NMP ALRA, the applicant states that accessible non-EQ cables and connections documents (e.g., bulletins, letters, notices, advisories, etc.) received by NMP shall be thoroughly reviewed for applicability to NMP. Documents affecting or thought to be affecting NMP shall be entered into its corrective action program for resolution. Operating experience (OE) reports are reviewed to assess the potential impact. OE found to be applicable to NMP is added to its corrective action program for resolution.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant’s Non-EQ Electrical Cables and Connections Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

The project team recognizes that the corrective action program, which captures internal and external plant operating experience issues, will ensure that operating experience is reviewed and incorporated in the future to provide objective evidence to support the conclusion that the effects of aging are adequately managed.

2.28.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the Non-EQ Electrical Cables and Connections Program in NMP ALRA, Appendix A, Section A1.1.24 for NMP Unit 1 and Section A2.1.24 for NMP Unit 2, respectively, which state that this is a new program that manages aging of cables and connectors within the scope of license renewal exposed to adverse localized temperature, moisture, or radiation environments. Program activities include periodic visual inspection of susceptible cables for evidence of cable and connection jacket surface anomalies. This program will be implemented prior to the period of extended operation.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.29, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.28.7 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR and USAR Supplements for this program, the project team finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.29 NON-EQ ELECTRICAL CABLES AND CONNECTIONS USED IN INSTRUMENTATION CIRCUITS PROGRAM (NMP AMP B2.1.30)

In NMP ALRA, Appendix B, Section B2.1.30, the applicant states that NMP AMP B2.1.30, "Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program," is an existing plant program that is consistent with GALL AMP XI.E2, "Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits," with enhancements.

2.29.1 Program Description

The applicant states in the NMP ALRA, that this program manages the aging of cables exposed to adverse localized temperature and radiation environments that could result in loss of insulation resistance. This program applies to accessible and inaccessible electrical cables that are not in the EQ Program and are used in circuits with sensitive, high-voltage, low-level signals such as radiation monitoring, nuclear instrumentation, and other such cables subject to an aging management review that are sensitive to a reduction in insulation resistance. Activities include routine calibration tests of instrumentation loops or direct testing of the cable system in those cases where cable testing is conducted as an alternate to surveillance testing and preventive maintenance programs. Testing is based on requirements of the particular calibration, surveillance or testing performed on the specific instrumentation circuit or cable and is implemented through the applicant's work control system. Where cable testing is conducted as an alternate to surveillance testing, the acceptance criteria for each test will be defined by the specific type of test performed and the specific cable tested.

2.29.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.30 is consistent with GALL AMP XI.E2, with enhancements.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.30, including program basis document, LR-PBD-ELECT2, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits," which provides an assessment of the AMP elements' consistency with GALL AMP XI.E2.

The project team reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.30 and associated basis documents against GALL AMP XI.E2 for consistency.

The project team reviewed Nuclear Engineering Report (NER)-1E-028, "Identification of NMP1 Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits in the Scope of the License Renewal Program," for NMP Unit 1 and NER-2E-033, "Identification of NMP2 Non-EQ Electrical Cables and Connections Used in Instrumentation Cables and Connections Used in Instrumentation Circuits in the Scope of the License Renewal Program," for NMP Unit 2. The project team found inconsistency between NMP Unit 1 and NMP Unit 2 AMP B2.1.30 program scopes. For example, the scope for NMP Unit 1 includes power range monitoring (PRM), and intermediate range monitoring (IRM). However, the AMP scope for NMP Unit 2 only includes the IRM circuit. During the audit and review, the project team requested that the applicant review the NERs and clarify the differences between the scoping of the two units. The applicant provided clarifications of differences between the scoping of NMP Unit 1 and NMP Unit 2. The applicant indicated that some cables are not within the scope of NMP AMP B2.1.30 because these cables are in the EQ Program and, therefore, not within the scope of NMP AMP B2.1.30. The applicant also informed the project team that as a result of responding to the project team's request, it reviewed the NERs and found a discrepancy between the safety classification of NMP Unit 1 and NMP Unit 2. The applicant informed the project team that it would initiate a correction report to revise NER-1E-028, NER-2E-033 and the program basis document to document the discrepancy between NMP Unit 1 and NMP Unit 2. The project team finds the applicant's response acceptable. The project team reviewed the applicant's revised program basis document and revised NER and concludes that the scope of cables in NMP AMP B2.1.30 is acceptable.

During the audit and review, the project team also requested that the applicant verify tests performed by procedures credited in the NMP AMP B2.1.30 program basis document including the entire loop (cables and connections). The applicant responded that the credited procedure steps listed in its program basis document (GALL program element "acceptance criteria") were reviewed to ensure that all cables and connections of the system to be tested were part of the test. For each procedure credited, it has been verified that all cables and connections within the scope of GALL AMP XI.E2 are tested by the credited procedure steps. The project team finds the applicant's response acceptable.

The project team reviewed those portions of the Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program for which the applicant claims consistency with GALL AMP XI.E2 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program provides reasonable assurance that aging management of conductor insulation due to heat, radiation, or moisture for electrical cables used in instrumentation circuits will be adequately performed. The project team finds the applicant's Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program acceptable because it conforms to the recommended GALL AMP XI.E2, "Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits," with the enhancements as described below.

2.29.3 Exceptions to the GALL Report

None

2.29.4 Enhancements

The applicant states, in the NMP ALRA, that the enhancements in meeting the GALL Report program element are as follows:

Element:	4: Detection of Aging Effects
Enhancements:	Implement reviews of calibration or surveillance data for indications of aging degradation affecting instrument circuit performance. The first reviews will be completed prior to the period of extended operation and every ten years thereafter. A review of the calibration and surveillance results can provide indication of aging effects/mechanisms by monitoring key parameters and providing data based upon acceptance criteria related to instrumentation circuit performance. Review of the data occurs at the time that the calibrations and surveillances are performed, thereby providing reasonable assurance that severe aging degradation will be detected prior to loss of the cables's intended function. (Commitment 28 for NMP Unit 1 and Commitment 26 for NMP Unit 2) In cases where a calibration or surveillance program does not include the cabling system in the testing circuit, or as an

alternative to the review of calibration results described above, provide requirements and procedures to perform cable testing to detect deterioration of the insulation system, such as insulation resistance tests or other testing judged to be effective in determining cable insulation condition. The first test will be completed prior to the period of extended operation. The test frequency of these cable shall be determined based on engineering evaluation, but shall not exceed 10 years. (Commitment 28 for NMP Unit 1 and Commitment 26 for NMP Unit 2)

Enhancements are scheduled for completion prior to the period of extended operation.
(Commitment 28 for NMP Unit 1 and Commitment 26 for NMP Unit 2)

The GALL Report identifies the following recommendations for the “detection of aging effects” program element associated with the enhancements:

> Calibration provides sufficient indication of the need for corrective actions by monitoring key parameters and providing trending data based on acceptable criteria related to instrumentation loop performance. The normal calibration frequency specified in the plant technical specification provides reasonable assurance that severe aging degradation will be detected prior to loss of the cable intended function. The first tests for license renewal are to be completed before the period of extended operation.

The applicant states, in the NMP ALRA, that review of the data occurs at the time that the calibrations and surveillances are performed, thereby providing reasonable assurance that severe aging degradation will be detected prior to loss of the cable intended function. When the calibration or surveillance program does not include a cabling system, the applicant will perform cable testing to detect the deterioration of the insulation system, such as insulation resistance tests or other testing judged to be effective in determining the condition of cable insulation. During the audit and review, the project team finds that these enhancements will not adversely impact the ability of this AMP to manage the effects of aging since in this AMP, either one of the two methods is acceptable to identify the existence of aging degradation. Calibration results or findings of a surveillance testing program are evaluated to identify the existence of cable aging degradation. Direct testing of the cable system will be effective in determining the condition of cable insulation. On this basis, the project team finds this enhancement acceptable as such changes to the applicant’s program will provide additional assurance that the effects of aging will be adequately managed.

2.29.5 Operating Experience

The applicant states in the NMP ALRA, that it has reviewed both industry and plant-specific operating experience relating to the Non-EQ Electrical Cables Used in Instrumentation Circuits Program. Review of plant-specific operating experience revealed documentation of cable degradation identified through routine calibration testing that is similar to the industry operating experience (e.g., degraded cables for temperature instruments, degraded shielding for drywell instrument cables). The applicant’s Non-EQ Electrical Cables Used in Instrumentation Circuits Program is continually adjusted to account for industry experience and research. As additional operating experience is obtained, lessons learned will be used to adjust this program as needed.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant’s Non-EQ Electrical Cables Used in Instrumentation Circuits Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.29.6 <u>UFSAR and USAR Supplements</u>

The applicant provided its UFSAR and USAR Supplements for the Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program in NMP ALRA, Appendix A, Section A1.1.25 for NMP Unit 1 and Section A2.1.25 for NMP Unit 2, respectively, which state that its Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits Program manages aging of cables and connections exposed to adverse localized temperature and radiation environments that could result in loss of insulation resistance. It applies to accessible and inaccessible electrical cables that are not in the EQ Program and are used in circuits with sensitive, high-voltage, low-level signals such as radiation monitoring, nuclear instrumentation, and other such cables subject to an AMR that are sensitive to a reduction in insulation resistance. Activities include routine calibration tests of instrumentation loops or direct testing of the cable system in those cases where cable testing is conducted as an alternate to surveillance testing, and in either case are implemented through the surveillance testing and preventive maintenance programs. Testing is based on requirements of the particular calibrations, surveillance or testing performed on the specific instrumentation circuit or cable and is implemented through the work control system. Where cable testing is conducted as an alternative to surveillance testing, the acceptance criteria for each test will be defined by the specific cable tested.

The applicant states, in the NMP ALRA, that enhancements to the applicant’s Non-EQ Electrical Cables Used in Instrumentation Circuits Program include the following revisions to existing activities that are credited for license renewal:

- Implemented reviews of calibration surveillance data for indications of aging degradation affecting instrument circuit performance. The first reviews will be completed prior to the period of extended operation and every ten years thereafter.

- In cases where a calibration or surveillance program does not include the cabling system in the testing circuit, or as an alternative to the review of calibration results described above, provide requirements and procedures to perform cable testing to detect deterioration of the insulated system, such as insulation resistance tests or other testing judged to be effective in determining cable insulation conditions. The first test will be completed prior to the period of extended operation. The test frequency of these cables shall be determined based on engineering evaluation not to exceed every 10 years.

In addition, the applicant states, in the NMP ALRA, that enhancements will be completed prior to the period of extended operation.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.30, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.29.7 Conclusion

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. Also, the project team has reviewed the enhancements and determined that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.30 NON-EQ INACCESSIBLE MEDIUM VOLTAGE CABLES PROGRAM (NMP AMP B2.1.31)

In NMP ALRA, Appendix B, Section B2.1.31, the applicant deleted Section B2.1.31. In NMP ALRA Table 3.6.1, the applicant states that NMP Unit 1 has no inaccessible medium-voltage cables that are within the scope of license renewal. It also states that NMP Unit 2 has no inaccessible medium-voltage cables within the scope of license renewal that meet the GALL Report program criteria for requiring aging management.

During the audit and review, the project team reviewed NER-2E-032, "Identification of NMP2 Non-EQ Inaccessible Medium Voltage Cables in the Scope of the License Renewal Program" and identified at least one underground cable that is within the scope of license renewal and requires an AMP. For NMP Unit 1 and NMP Unit 2, the project team requested that the applicant identify any medium voltage cables (e.g., 2kV to 35 kV) that are within the scope of license renewal, energized greater than 25% of the time and are located underground. The project team also requested that the applicant specifically address plant service water systems in its response.

In a letter dated December 1, 2005, the applicant states that NMP Unit 1 does not have any inaccessible medium-voltage cables within the scope of license renewal that are exposed to significant moisture simultaneously with significant voltage. The only medium-voltage cables at NMP Unit 1 that are installed underground and are energized greater than 25% of the time are cables used to power systems that are not within the scope of license renewal or to power equipment that is not related to any plant systems. For service water systems, the applicant states that the normal service water system pump motors are powered via medium-voltage cables. These cables are routed in cable trays, wall sleeves and/or conduit that are installed inside the NMP Unit 1 turbine building and screen house. Therefore, these cables are not installed underground. The emergency service water system pump motors are powered via low-voltage (<2kV) cables, and therefore, these cables are not within the scope of GALL AMP XI.E3, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements."

The applicant also states, that NMP Unit 2 does have inaccessible medium-voltage cables that are within the scope of license renewal and are exposed to significant moisture simultaneously with significant voltage. The applicant identified 18 cables (including service water pump cables) in NMP Unit 2 within the scope of license renewal that require an AMP. The service water system pump motors are powered via medium-voltage cables from the safety related 4.16 kV switchgears. These cables are routed underground in duct lines. Since these cables are installed underground and the service water system pump motors are energized greater than 25% of the time, these cables require aging management. These cables are in the scope of GALL AMP XI.E3. Also in the letter dated December 1, 2005, the applicant states that it will revise NER-2E-032 to identify medium-voltage cables requiring aging management, develop an AMP and the program basis document per the recommendations of GALL AMP XI.E3, and revise the NMP ALRA to incorporate the AMP based on GALL AMP XI.E3. On this basis, the project team finds the applicant's response acceptable.

Sections 2.30.1 through 2.30.7 of this audit and review report are written based on the project team's review of the contents of the applicant's Non-EQ Inaccessible Medium Voltage Cables Program provided in the December 1, 2005 letter and which is made part of the NMP ALRA by supplement. In addition, the applicant has provided a basis document for the program.

2.30.1 Program Description

The applicant states, in the NMP ALRA, that this program is an existing program that is credited with managing aging effects/mechanisms through periodic maintenance activities that minimize or prevent the exposure of cables within the scope of license renewal to significant moisture or standing water. The applicant's Non-EQ Inaccessible Medium Voltage Cables Program provides reasonable assurance that the intended functions of inaccessible medium-voltage cables that are not subject to the environmental qualification requirements of 10 CFR 50.49 but exposed to adverse localized environments caused by moisture while energized, will be maintained consistent with the CLB through the period of extended operation. An adverse variation in environment is significant if it could appreciably increase the rate of aging of a component or have an immediate adverse effect on operability. In this AMP, periodic actions are taken to prevent cables from being exposed to significant moisture, such as inspecting for water collection in cable manholes and draining water, as needed. Additionally, medium-voltage cables within the scope of license renewal exposed to significant moisture and significant voltage are tested to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test. It will be a proven test for detecting deterioration of the insulation system due to wetting as described in EPRI TR-103834-P1-2, "Effects of Moisture on the Life of Power Plant Cables," such as power factor, partial discharge, or other testing that is both state-of-the-art and consistent with the latest industry guidance at the time the test is performed. The applicant's Non-EQ Inaccessible Medium Voltage Cables Program considers the technical information and guidance provided in NUREG/CR-5643, "Insights Gained From Aging Research," IEEE Standard P1205, "IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations," SAND96-0344, "Aging Management Guideline for Commercial Nuclear Power Plants - Electrical Cable and Terminations," and EPRI TR-109619. "Guideline for the Management of Adverse Localized Equipment Environments."

2.30.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.31 is consistent with GALL AMP XI.E3, with an enhancement.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.31, including program basis document, NMP-AMP-ELECT03, "Inaccessible Non-EQ Medium-Voltage Cables Inspection Program," which provides an assessment of the AMP elements' consistency with GALL AMP XI.E3. The project team also reviewed "Inaccessible Medium-Voltage Cables not Subject to 10 CFR 50.49 Environmental Qualification Requirements."

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.31 and associated basis documents against GALL AMP XI.E3 for consistency.

The applicant states that Section 4.2.3 of NMP-AMP-ELECT03 specifies that cables are tested to provide an indication of the condition of the conductor insulation. The specific testing for cables within the scope of license renewal associated with motors is detailed in procedure S-EPM-MPM-V080, "Site AC Motor Predictive Maintenance Testing." Test methods currently credited include polarization index and hi-pot testing. The specific testing associated with the cables supplying the auxiliary transformers will be detailed in an enhancement to procedure S-EPM-GEN-700, "Outdoor Transformer and Grounding Transformer Inspection PM." During the audit and review, the project team reviewed procedure S-EPM-MPM-V080 and in discussions with the applicant, the project team expressed a concern that hi-pot testing may adversely affect the life of medium-voltage cables. In response to the project team's concern, in a letter dated December 1, 2005, the applicant states that it will develop new testing procedures specific to those cables requiring aging management under this program. The specific type of test performed will be determined prior to the initial test and will be a proven test for detecting deterioration of the insulation system, as described in EPRI TR-103834-P1-2; such as power factor or partial discharge, or other testing that is state-of-the-art at the time the test is performed and consistent with the latest industry guidance at the time the test is performed.

In addition, the applicant made the following commitment:

Item 36: Enhance the Inaccessible Medium-Voltage Cables not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program as follows: (1) Expand the scope of the existing procedure to provide for manhole inspections and water removal, (2) develop a new testing procedure specific to those cables requiring aging management under this program. The specific type of test performed will be a proven test for detecting deterioration of the insulation system due to wetting as described in EPRI TR-103834-P1-2, such as power factor, partial discharge, or other testing that is both state-of-the-art and consistent with the latest industry guidance at the time the test is performed, (3) establish requirement to test cables subject to aging management prior to, and every 10 years during the period of extended operation, and (4) establish maintenance requirement to inspect and remove water, as necessary, from manholes serving cables subject to aging management. The inspection frequency will be based upon actual plant experience with water accumulation in the manhole, but in any event, will be at least once every two years. The first inspection will be completed prior to the period of extended operation.

The project team reviewed those portions of the Non-EQ Inaccessible Medium Voltage Cables Program for which the applicant claims consistency with GALL AMP XI.E3 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's Non-EQ Inaccessible Medium Voltage Cables Program provides reasonable assurance that the testing methods, preventive actions taken, and the testing frequency as described above are consistent with the updated GALL AMP XI.E3. The project team finds the applicant's Non-EQ Inaccessible Medium Voltage Cables Program acceptable because it conforms to the recommended GALL AMP XI.E3, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," with the enhancements as described below.

2.30.3 Exceptions to the GALL Report

None

2.30.4 Enhancements

Nine Mile Point Audit and Review Report

The applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

> Element: 2: Preventive Actions
> Enhancement: Expand the scope of the existing manhole inspection procedure to include those serving the cables within the scope of the program. (Commitment 38 for NMP Unit 2)

The GALL Report identifies the following recommendation for the "preventive actions" program element associated with the enhancement:

> Periodic actions are taken to prevent cables from being exposed to significant moisture such as inspecting for water collection in cables manholes, and draining water, as needed. If such actions are taken, testing of cables are not required.

In addition, the applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

> Element: 3: Parameters Monitored/Inspected
> Enhancement: Develop new testing procedure specific to those cables requiring aging management under this program. The specific type of test performed will be a proven test for detecting deterioration of the insulation system, as described in EPRI TR-103834-P1-2, such as power factor or partial discharge, or other testing that is state-of-the-art at the time the test is performed and consistent with the latest industry guidance at the time the test is performed. (Commitment 38 for NMP Unit 2)

The GALL Report identifies the following recommendation for the "parameters monitored/inspected" program element associated with the enhancement:

> In-scope, medium-voltage cables exposed to significant moisture and significant voltage are tested to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test, and is to be a proven test for detecting deterioration of the insulation system due to wetting, such as power factor, partial discharge, or polarization index, as described in EPRI TR-103834-P1-2, or other test that is state-of-the-art at the time the test is performed.

Furthermore, the applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

Element:	4: Detection of Aging Effects
Enhancement:	Establish maintenance requirement to test cables subject to aging management prior to, and every 10 years during, the period of extended operation. (Commitment 38 for NMP Unit 2) Establish maintenance requirement to inspect and remove water, as necessary, from manholes serving cables subject to aging management. The inspection frequency will be based on actual plant experience with water accumulation in the manhole, but in any event, will be at least once every two years. The first inspection will be completed prior to the period of extended operation.

The GALL Report identifies the following recommendation for the “detection of aging effects” program element associated with the enhancement:

> In scope, medium-voltage cables exposed to significant moisture and significant voltage are tested at least once every 10 years. This is an adequate period to preclude failures of the conductor insulation since experience has shown that aging degradation is a slow process. A 10 year inspection frequency will provide two data points during a 20-year period, which can be used to characterize the degradation rate. The first tests for license renewal are to be completed before the period of extended operation.

The applicant states, in the NMP ALRA, that these enhancements will not adversely impact the ability of this AMP to manage the effects of aging since in this AMP, periodic actions are taken to prevent cables from being exposed to significant moisture, such as inspecting for water collection in cable manholes, and draining water, as needed. The above actions are not sufficient to assure that water is not trapped elsewhere in the raceways. In addition to periodic actions, within the scope of license renewal, medium voltage cables exposed to significant moisture and significant voltage are tested to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test, and is to be a proven test for detecting deterioration of the insulation system due to wetting. On this basis, the project team finds the enhancements to be acceptable.

2.30.5 Operating Experience

The applicant states, in the NMP ALRA, that it has reviewed both industry and plant specific operating experience relating to its Non-EQ Inaccessible Medium Voltage Cables Program. Although infrequent, there have been some failures of medium voltage cables at other plants due to moisture intrusion. While there have been no such events at NMP Unit 2, various industry studies suggest that a regular cable testing program can detect degradation of non-EQ inaccessible medium voltage cables before there is an insulation failure.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's Non-EQ Inaccessible Medium Voltage Cables Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.30.6 USAR Supplement

The applicant provides its USAR Supplement for the Non-EQ Inaccessible Medium Voltage Cables Program in NMP ALRA, Appendix A, Section A2.1.26 for NMP Unit 2, which states that its Non-EQ Inaccessible Medium Voltage Cables Program is an existing program that provides reasonable assurance that the intended function of inaccessible medium-voltage cables that are not subject to the environmental qualification requirements of 10 CFR 50.49 and are exposed to adverse localized environments caused by moisture while energized will be maintained consistent with the current licensing basis through the period of extended operation. An adverse localized environment is a condition in a limited plant area that is significantly more severe than the specified service environment for the cable. An adverse variation in environment is significant if it could appreciably increase the rate of aging of a component or have an immediate adverse effect on operability. In this AMP, periodic actions are taken to prevent cables from being exposed to significant moisture, such as inspecting for water collection in cable manholes and draining water, as needed. Additionally, within the scope of license renewal medium-voltage cables exposed to significant moisture and significant voltage are tested to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test, and will be a proven test for detecting deterioration of the insulation system due to wetting, such as power factor or partial discharge, as described in EPRI TR-103834-P1-2, or other testing that is state-of-the-art at the time the test is performed. The program considered the technical information and guidance provided in applicable industry publications.

The applicant also states, in the NMP ALRA, that enhancements to its Non-EQ Inaccessible Medium Voltage Cables Program include:

- Expand the scope of the existing procedures to provide for manhole inspection and water removal.

- Develop new testing procedure specific to those cables requiring aging management under this program. The specific type of test performed will be determined prior to the initial test, will be a proven test for detecting deterioration of the insulation system due to wetting as described in EPRI-TR-103834-P1-2, such as power factor, partial discharge, or other testing that is both state-of-the-art and consistent with the latest industry guidance at the time the test is performed.

- Establish maintenance requirement to test cables subject to aging management prior to, and every 10 years during, the period of extended operation.

- Establish maintenance requirement to inspect and remove water, as necessary, from manholes serving cables subject to aging management. The inspection frequency will be based on actual plant experience with water accumulation in the manhole, but in any event, will be at least once every two years. The first inspection will be completed prior to the period or extended operation.

In addition, the applicant states, in the NMP ALRA, that enhancements will be implemented prior to the period of extended operation.

The project team reviewed the USAR Supplement for NMP AMP B2.1.31, found that it was consistent with the GALL Report, and determined that it provides an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.30.7 Conclusion

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. Also, the project team has reviewed the enhancements and determined that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the USAR Supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.31 NON-SEGREGATED BUS INSPECTION PROGRAM (NMP AMP B2.1.34)

In NMP ALRA, Appendix B, Section B2.1.34, the applicant describes NMP AMP B2.1.34, "Non-Segregated Bus Inspection Program."

The applicant states that NMP AMP B2.1.34 is an existing plant-specific program that consists of the appropriate ten elements described in Appendix A of the SRP-LR, with exceptions. The Non-Segregated Bus Inspection Program is consistent with the industry and regulatory license renewal precedence. This program inspects components and materials internal to the non-segregated bus ducts that connect the reserve auxiliary transformers to the 4160V buses required for the recovery of offsite power to both units following a station blackout (SBO) event. Based upon the most recent industry and regulatory license renewal precedence, this program also includes bus ducts associated with power boards feeding components within the scope of license renewal. They are normally energized, and therefore, the bus duct insulation material will experience temperature rise due to energization, which may cause age-related degradation during the extended period of operation. This inspection program considers the technical information and guidance provided in References 20, 21, 22, 23, and the latest industry and regulatory information on bus duct aging management.

The project team reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.34, including program basis document, LR-PBD-ELECT4, “Aging Management Program for Bus Duct,” and interviewed the applicant's technical staff.

2.31.1 Review of the AMP Against the Program Elements

The project team reviewed NMP AMP B2.1.34 against the AMP elements found in SRP-LR, Appendix A.1, Section A.1.2.3 and SRP-LR Table A.1-1. The project team followed the reviewed process as described in the NMP audit and review plan.

2.31.1.1 Scope of Program

The “scope of program” program element criterion in Appendix A.1.2.3.1 of the SRP-LR requires that the program scope include the specific structures and components addressed with this program.

The applicant states in NMP AMP B2.1.34, for the “scope of program” program element, that this program applies to the bus ducts within the scope of license renewal; i.e., those non-segregated bus ducts that connect the reserve auxiliary transformers to the 4160V buses required for the recovery of offsite power to both units following an SBO event, as well those associated with power boards feeding components within the scope of license renewal.

The project team determined that the specific components for which the program manages aging effects/mechanisms are identified, which satisfies the criterion defined in Appendix A.1.2.3.1 of the SRP-LR. On this basis, the project team finds the applicant’s scope of program acceptable.

2.31.1.2 Preventive Actions

The “preventive actions” program element criterion in Appendix A.1.2.3.2 of the SRP-LR is that condition monitoring programs do not rely on preventive actions, and thus, preventive actions need not be provided.

The applicant states in NMP AMP B2.1.34, for the “preventive actions” program element, that this program is an inspection program and no actions are taken as part of this program to prevent or mitigate aging degradation.

The project team determined that the preventive actions program element satisfies the criterion defined in Appendix A.1.2.3.2 of the SRP-LR. The project team finds it acceptable because this is an inspection program and there is no need for preventive actions. On this basis, the project team finds it acceptable.

2.31.1.3 <u>Parameters Monitored/Inspected</u>

The relevant "parameters monitored or inspected" program element criteria in Appendix A.1.2.3.3 of the SRP-LR are

> The parameters to be monitored or inspected should be identified and linked to the degradation of the particular structure and component intended function(s).
>
> The parameter monitored or inspected should detect the presence and extent of aging effects/mechanisms.

The applicant states in NMP AMP B2.1.34, for the "parameters monitored or inspected" program element, that a sample of accessible bolted connections (bus joints and ending devices) will be checked for proper torque, or the resistance of bolted joints will be checked using a micro-ohm meter of sufficient current capacity that is suitable for checking bus bar connections. This program also inspects the internal portions of accessible bus ducts for cracks, corrosion, foreign debris, dust buildup, and water intrusion. The bus insulation system is inspected for signs of embrittlement, cracking, melting, swelling, or discoloration, which may indicate overheating or age-related degradation. The internal bus supports (insulators) will be inspected for structural integrity and cracking.

Vendors do not typically recommend re-torque of bolted connections unless the joint requires service or the bolted connections are clearly loose. The torque required to turn the fastener in the tightening directions (restart torque) is not a good indication of the preload once the fastener is in service. Due to relaxation of the parts of the joint, the final loads are likely to be lower than the installed loads. During the audit and review, the project team asked the applicant to provide a technical justification of how re-torquing of bolted connections is a good indication of the preload once the fastener is in service. In response to the project team's request, the applicant informed the project team that it will revise NMP ALRA Sections A1.1.27, A2.1.27 and NMP AMP B2.1.34 to delete the torque test/torque checks, and include, as an alternate to thermography or measuring connection resistance of bolted connection, a visual inspection for the accessible bolted connections that are covered with heat sink tape, sleeving, insulating boots, etc. (Commitment 31 for NMP Unit 1 and Commitment 29 for NMP Unit 2). The project team finds the applicant's response acceptable because using thermography, resistance check, or a visual inspection of bolted connections that are covered with heat sink tape, sleeving, or insulating boots will provide reasonable assurance that bolted connections are not loose due to ohmic heating. The project team also finds that the six-year inspection frequency is an adequate period to preclude failures of bus ducts since industry experience has shown that the aging degradation is a slow process. In a letter dated December 1, 2005, the applicant stated that it will revise the NMP ALRA to incorporate the above changes.

The project team determined that the parameters monitored/inspected program element satisfies the criterion defined in Appendix A.1.2.3.3 of the SRP-LR. Visual inspections of internal portions of bus ducts will detect cracks, corrosion, debris, dust, and evidence of water intrusion. Visual inspections of the bus insulating system will detect embrittlement, cracking, melting, swelling, and discoloration which indicate overheating or age-related degradation. On this basis, the project team finds that the applicant's parameters monitored or inspected acceptable.

2.31.1.4 Detection of Aging Effects

The relevant “detection of aging effects” program element criteria in Appendix A.1.2.3.4 of the SRP-LR are

> Provide information that links the parameters to be monitored or inspected to the aging effects/mechanisms being managed.
>
> Describe when, where, and how program data are collected (i.e., all aspects of activities to collect data as part of the program).
>
> Link the method or technique and frequency, if applicable, to plant-specific or industry-wide operating experience.
>
> Provide the basis for the inspection population and sample size when sampling is used to inspect a group of SCs. 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/mechanisms.

The applicant states in NMP AMP B2.1.34, for the “detection of aging effects” program element, that visual inspections of internal portions of bus ducts detects cracks, corrosion, debris, dust, and evidence of water intrusion. Visual inspections of the bus insulating system detects embrittlement, cracking, melting, swelling, and discoloration. Visual inspections of bus supports (insulators) detects cracking and lack of structural integrity. Internal portions of bus ducts, the bus insulation system, and the bus supports (insulators) are visually inspected approximately every six years. A resistance test of the bus ducts or a torque test of a sample of accessible bolted connections will be performed approximately every six years. An initial inspection will be completed before the end of the initial 40-year license term. This is an adequate period to identify failures of the bus ducts since experience has shown that aging degradation is a slow process. A six-year inspection frequency will provide up to three data points during a 20-year period, which can be used to characterize the degradation rate. If unacceptable degradation is found, as indicated by either increased resistance or visual anomalies, the inspections will be expanded to determine the extent of the condition.

During the audit and review, the applicant agreed to address the project team’s concern and remove the torque test/torque check options as indicated in Element 3. The applicant will determine the sample size by using accepted industry practice and/or vendor recommendation.

The project team determined that this program element satisfies the criteria defined in Appendix A.1.2.3.4 of the SRP-LR. Visual inspection of the bus insulating system will detect embrittlement, cracking, melting, swelling, and discoloration which are aging effects/mechanisms of insulation materials due to heating. A resistance test of bolted connections will detect bolting loosening due to thermal cycling. The project team also finds that the proposed frequency is acceptable because the expected aging degradation is a slow process. On this basis, the project team finds that the applicant's detection of aging effects is acceptable.

2.31.1.5 Monitoring and Trending

The relevant “monitoring and trending” program element criteria in Appendix A Section A.1.2.3.5 of the SRP-LR are

> 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.
>
> This program element describes how the data collected are evaluated and may also include trending for a forward look. The parameter or indicator trended should be described.

The applicant states in NMP AMP B2.1.34, for the “monitoring and trending” program element, that in this program, trending is not included as part of this program because the ability to trend inspection results is limited by available data; however, inspection results will be used to characterize degradation rates. This exception is consistent with latest industry and regulatory license renewal precedence. Existing inspection procedures will be enhanced to expand visual inspections of the bus ducts, their support and insulation systems. Also, new provisions will be made to perform either periodic low range resistance checks of the bus ducts or torque of a statistical sample of accessible bolted connections. The project team finds that the absence of trending for testing is acceptable since the test is performed every six years and the project team did not see a need for such activities.

The project team determines that for visual inspection, this program element satisfies the criteria defined in Appendix A.1.2.3.5 of the SRP-LR. The project team finds that the absence of trending for testing is acceptable since the test is performed every six years and the ability to trend inspection results is limited by available data. Furthermore, the project team did not see a need for such activities. On this basis, the project team finds that the applicant's monitoring and trending is acceptable.

2.31.1.6 Acceptance Criteria

The key “acceptance criteria” program element criteria in Appendix A.1.2.3.6 of the SRP-LR are

> The acceptance criteria of the program and its basis should be described. The acceptance criteria, against which the need for corrective actions will be evaluated, should ensure that the SC intended function(s) are maintained under all CLB design conditions during the period of extended operation.

> The program should include a methodology for analyzing the results against applicable acceptance criteria.
>
> 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.

The applicant states in NMP AMP B2.1.34, for the “acceptance criteria” program element, that bolted connections must meet the manufacturer’s minimum torque specifications, or the low resistance value of the bus ducts must be appropriate for the application. Bus ducts are to be free from unacceptable visual indications of surface anomalies that suggest that conductor insulation degradation exists. Additional acceptance criteria include no indication of unacceptable corrosion, cracking, foreign debris, excessive dust buildup, or moisture intrusion. Any condition or situation that, if not corrected, could lead to a loss of intended function is considered unacceptable. As discussed above, during the audit and review, the project team expressed its concern about the re-torquing of the bolted connections. The applicant informed the project team that it will revise the acceptance criteria to delete the torque test/torque check option, and include, as an alternate to thermography or measuring connection resistance of bolted connections, a visual inspection for the accessible bolted connection that are covered with heat shrink tape, sleeving insulating, boots, etc. (Commitment 31 for NMP Unit 1 and Commitment 29 for NMP Unit 2). In a letter dated December 1, 2005, the applicant states that it will revise the NMP ALRA to incorporate the changes as described.

The project team reviewed this program element to determine whether or not it satisfies the criteria defined in Appendix A.1.2.3.6 of the SRP-LR. The project team finds that the acceptance criteria is acceptable since the low resistance value of the bus ducts must be appropriate for the application. Bus ducts are to be free from unacceptable visual indications of surface anomalies that suggest that conductor insulation degradation exists. Additional acceptance criteria include no indication of unacceptable corrosion, cracking, foreign debris, excessive dust buildup, or moisture intrusion. On this basis, the project team finds that the applicant's acceptance criteria is acceptable.

2.31.1.7 Corrective Actions

The adequacy of the applicant's 10 CFR 50, Appendix B Program associated with this program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the NMP ALRA.

The project team reviewed other aspects of this program element to determine whether or not it satisfies the criteria defined in Appendix A.1.2.3.7 of the SRP-LR. The applicant states that corrective actions are documented using the DER process. The Quality Assurance Program Topical Report (Appendix B to “Nine Mile Point Nuclear Station Unit 1 Final Safety Analysis Report (Updated)” and Appendix B to “Nine Mile Point Nuclear Station Unit 2 Updated Safety Analysis Report”) documents the applicant’s commitment to the corrective action criteria of 10 CFR 50, Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants.” The applicant’s Corrective Action Program includes the identification and correction of conditions adverse to quality and the identification, cause determination, correction, and actions to minimize recurrence for significant conditions adverse to quality. GALL AMP XI.E4, which incorporated ISG-17, “Proposed Aging Management Program (AMP) XI.E4, 'Periodic Inspection of Bus Ducts,'” under corrective actions, states that further investigation and evaluation are performed when the acceptance criteria are not met. Corrective actions may include but are not limited to cleaning, drying, increased inspection frequency, replacement, or repair of the affected metal enclosed bus components. If an unacceptable condition or situation is identified, a determination is made as to whether the same condition or situation is applicable to other accessible or inaccessible. The applicant’s Correction Action Program does not address the specific requirement identified in GALL AMP XI.E4. In addition to 10 CFR Part 50, Appendix B, during the audit and review, the project team requested that the applicant revise the corrective action in NMP AMP B2.1.34 to add specific requirements or provide a justification of why these corrective actions are not necessary. The applicant informed the project team that it will revise NMP AMP B2.1.34 by adding the following to the “Corrective Actions” program element:

> Further investigation and evaluation are performed when the acceptance criteria are not met. Corrective actions may include but are not limited to cleaning, drying, increased inspection frequency, replacement, or repair of the affected bus duct components. If an unacceptable condition or situation is identified, a determination is made to whether the same condition or situation is applicable to other accessible or inaccessible bus duct/components.

Also, the applicant will update its program basis document as follows:

> Revise Element 7.1 in Table 5.0-1 under Assessment of Consistent with the GALL Report, third sentence to read: “Corrective action may include but are not limited to cleaning, drying, increased inspection frequency, replacement, or rework of the affected bus insulation components.”

The project team finds the applicant’s response acceptable because it is consistent with corrective actions in GALL AMP XI.E4. In a letter dated December 1, 2005, the applicant states that it will revise the NMP ALRA and its program basis document to incorporate the changes described above. On this basis, the project team finds that the applicant's corrective actions is acceptable.

2.31.1.8 Confirmation Process

The adequacy of the applicant's 10 CFR 50, Appendix B Program associated with this program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the NMP ALRA.

The project team reviewed other aspects of this program element to determine whether or not it satisfies the criteria defined in Appendix A.1.2.3.8 of the SRP-LR. The project team finds the requirements of 10 CFR Part 50, Appendix B, acceptable to address administrative controls. On this basis, the project team finds that the applicant's confirmation process is acceptable.

2.31.1.9 Administrative Controls

The adequacy of the applicant's 10 CFR 50, Appendix B Program associated with this program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the NMP ALRA.

The project team reviewed other aspects of this program element to determine whether or not it satisfies the criteria defined in Appendix A.1.2.3.9 of the SRP-LR. The project team finds the requirements of 10 CFR Part 50, Appendix B, acceptable to address administrative controls. On this basis, the project team finds that the applicant's administrative controls is acceptable.

2.31.1.10 Operating Experience

The “operating experience” program element criterion in Appendix A.1.2.3.10 of the SRP-LR states that operating experience 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.

The applicant states, in the NMP ALRA, for the “operating experience” program element, that inspections of the bus ducts within the scope of license renewal at NMP have not revealed any age related degradation that could result in a loss of intended function. During the audit and review, the project team noted that industry experience has shown that failures have occurred on bus ducts caused by cracked insulation and moisture or debris buildup internal to the bus ducts. It has also shown that the bus connections in the bus ducts exposed to appreciable ohmic heating during operation may experience loosening due to repeated cycling of connected loads. The project team finds that the proposed program will provide reasonable assurance that bus ducts are not exposed to excessive ohmic or ambient heating.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant’s Non-Segregated Bus Inspection Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.31.2 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the Non-Segregated Bus Inspection Program in NMP ALRA, Appendix A, Section A1.1.27, for NMP Unit 1 and A2.1.27 for NMP Unit 2, which state that its Non-Segregated Bus Inspection Program is an existing plant-specific program that manages aging effects/mechanisms for components and materials internal to the non-segregated bus ducts that connect the reserve auxiliary transformer to the 4160V buses required for the recovery of offsite power following a station blackout (SBO) event. Based upon the most recent industry and regulatory license renewal precedence this program also includes normally energized bus ducts associated with boards feeding components within the scope of license renewal. These normally-energized components are not subject to the environmental qualification requirements of 10 CFR 50.49, but can be affected by elevated temperatures prior to the end of the period of extended operation. Program activities include visual inspections of internal portions of the bus ducts to detect cracks, corrosion, debris, dust, and moisture; visual inspections of the bus insulating system to detect embrittlement, cracking, melting, swelling, and discoloration; visual inspections of bus supports (insulators) to detect cracking and lack of structural integrity; and a torque test or a resistance test of a sample of accessible bolted connections. The program considers the technical information and guidance provided in applicable industry. Analytical trending is not included in this activity because the ability to trend inspection results is limited. This is an exception to the “Monitoring and Trending” element in Appendix A.1.2.3.5 of the SPR-LR. Enhancements to the applicant’s Non-Segregated Bus Inspection Program include expanded visual inspections of the bus ducts, their supports and insulation systems, as well as the performance of low range resistance checks of the bus ducts or torque checks from a statistical sample of accessible bolted connections. Enhancements will be implemented prior to the period of extended operations.

As discussed above, during the audit and review, the applicant informed the project team that it would revise the UFSAR Supplement to delete the torque test/torque checks, and include, as an alternate to thermography or measuring connection resistance of bolted connections, a visual inspection for the accessible bolted connections that are covered with heat shrink tape, sleeving, insulating boots, etc. In a letter dated December 1, 2005, the applicant states that it will revise the UFSAR Supplement as described above.

The project team reviewed the UFSAR Supplement, found that it was consistent with the GALL Report, and determines that it provides an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.31.3 Conclusion

On the basis of its review and audit of the applicant’s program, the project team finds that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the project team has reviewed the exception and the associated justifications and determined that the AMP, with the exception is adequate to manage the aging effects/mechanisms for which it is credited. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.32 BWR CONTROL ROD DRIVE RETURN LINE (CRDRL) NOZZLE PROGRAM (NMP AMP B2.1.37)

In NMP ALRA, Appendix B, Section B2.1.37, the applicant states that NMP AMP B2.1.37, “BWR Control Rod Drive Return Line (CRDRL) Nozzle Program,” is an existing plant program that is consistent with GALL AMP XI.M6, “BWR Control Rod Drive Return Line Nozzle,” with exceptions.

2.32.1 Program Description

The applicant states, in the NMP ALRA, that the NMP Unit 1 CRDRL nozzle is examined in accordance with the ASME Code, Section XI Program which satisfies the requirements in GALL AMP XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC and IWD” as described in NMP AMP B2.1.1. This program is updated in accordance with 10 CFR 50.55a. Augmented examinations incorporated into the ISI Program plan that implemented the requirements of NUREG-0619, “BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking,” have been superseded by ASME Section XI, Appendix VIII, “Performance Demonstration for Ultrasonic Examination Systems,” (1995 Edition with the 1996 Addenda).

In addition, the applicant states, in the NMP ALRA, that NMP Unit 2 cut and capped the CRD return nozzle prior to commercial operation. The capped NMP Unit 2 CRD return nozzle was therefore not subject to the augmented examination requirements described in NUREG-0619. The NMP Unit 2 CRDRL Nozzle Program is implemented through ASME Section XI, Subsection IWB, Table IWB 2500-1 (1989 Edition no addenda) and ASME Section XI, Appendix VIII, “Performance Demonstration for Ultrasonic Examination Systems,” (1995 Edition with the 1996 Addenda).

2.32.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.37 is consistent with GALL AMP XI.M6, with exceptions.

The project team interviewed the applicant's technical staff and reviewed the document listed in Attachment 5 of this audit and review report for NMP AMP B2.1.37, including program basis document, LR-PBD-CRDRL, “BWR Control Rod Drive Return Line Nozzle (Units 1 and 2),” which provides an assessment of the AMP elements' consistency with GALL AMP XI.M6.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.37 and associated basis documents against GALL AMP XI.M6 for consistency.

The project team reviewed those portions of the BWR Control Rod Drive Return Line Nozzle Program for which the applicant claims consistency with GALL AMP XI.M6 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant’s BWR Control Rod Drive Return Line Nozzle Program has included actions to mitigate cracking as well as enhanced inspections to detect crack initiation and growth, providing reasonable assurance that crack initiation and growth will be adequately managed during the period of extended operation. The project team finds the applicant's BWR Control Rod Drive Return Line Nozzle Program acceptable because it conforms to the recommended GALL AMP XI.M6, "BWR Control Rod Drive Return Line Nozzle," with the exceptions as described below.

2.32.3 Exceptions to the GALL Report

The applicant states, in the NMP ALRA, that the exception to the GALL Report program description is as follows:

> Exception: The first exception is to the Program Description in GALL AMP XI.M6, and involves the edition of the ASME Code used as the basis for the Section XI requirements. GALL AMP XI.M6 identifies the 1995 Edition (including the 1996 Addenda) of ASME Section XI as the basis for the GALL CRDRL Nozzle Program. The NMP Inservice Inspection (ISI) Program will not comply with the Edition and Addenda of ASME Section XI cited in the GALL Report because the program is updated to the latest Edition and Addenda of ASME Section XI, as mandated by 10 CFR 50.55a, prior to the start of each inspection interval. The acceptability of the existing NMP Unit 1 CRDRL Nozzle Program in meeting the augmented inspection requirements established in NUREG-0619 is documented in NRC Safety Evaluation Report dated 02/05/1999.

The GALL Report identifies the following recommendations for the "program description" program element associated with the first exception taken:

> This program includes (a) enhanced inservice inspection (ISI) in conformance with the ASME Code, Section XI, Subsection IWB, Table IWB 2500-1 (1995 Edition through the 1996 Addenda) and the recommendations of NUREG-0619, and (b) system modifications and maintenance programs to mitigate cracking. The program specifies periodic liquid penetrant and ultrasonic inspection of critical regions of boiling water reactor (BWR) control rod drive return line (CRDRL) nozzle.

The applicant states, in the NMP ALRA, that the exceptions were found acceptable in NRC Safety Evaluation Report dated 2/05/1999. As mandated by 10 CFR 50.55a, ultrasonic examinations are performed in accordance with ASME Section XI, Appendix VIII 1995 Edition with the 1996 Addenda. The project team also noted that the applicant's ASME code of record for ASME Section XI Inservice Inspection (Subsections IWB, IWC and IWD) is valid for a 10-year inspection interval under the current licensing basis. At present, an ASME Section XI Inservice Inspection (Subsection IWB, IWC and IWD) program is approved for use on an ASME Code 10-year ISI interval specific basis. However, the applicant will have to request approval to use the ASME Section XI Inservice Inspection (Subsection IWB, IWC and IWD) Program for the specific intervals during the period of extended operation in accordance with 10 CFR 50.55a, 12 months prior to each interval. Therefore, the project team finds that the ASME

Section XI Code Edition in effect, as referenced in 10 CFR 50.55a, 12 months prior to each inspection interval of extended operation, is acceptable for the period of extended operation. On this basis, the project team finds this exception acceptable.

In addition, the applicant states, in the NMP ALRA, that the exceptions to the GALL Report program elements are as follows:

Elements: 4: Detection of Aging Effects
5: Monitoring and Trending
6: Acceptance Criteria

Exception: The three exceptions to GALL AMP XI.M6, are: 1) the NMP Inservice Inspection (ISI) Program does not comply with the specific Edition and Addenda of ASME Section XI cited in the GALL Report because the program is updated to the latest Edition and Addenda of ASME Section XI, as mandated by 10 CFR 50.55a, prior to the start of each inspection interval; 2) the NMP program uses enhanced ultrasonic inspection techniques instead of PT inspections to satisfy the recommendations of NUREG-0619 (now superceded by Appendix VIII to ASME Section XI, Division 1, 1995 Edition with the 1996 Addenda); and, 3) the NMP program uses an inspection frequency of every 10 years versus every sixth refueling outage or 90 startup/shutdown cycles specified in NUREG-0619.

The GALL Report identifies the following recommendations for the program elements associated with the second and third exceptions taken:

Detection of Aging Effects: The extent and schedule of inspection, as delineated in NUREG-0619, assures detection of cracks before the loss of intended function of the component. Inspection recommendations include liquid PT of the CRDRL nozzle blend radius and bore regions and the reactor vessel wall area beneath the nozzle, return-flow-capacity demonstration, CRD-system-performance testing and ultrasonic inspection of welded connections in the rerouted line. The inspection is to include base metal to a distance of one-pipe-wall thickness or 0.5 inches, whichever is greater, on both sides of the weld.

Monitoring and Trending: The inspection schedule of NUREG-0619 provides timely detection of cracks.

Acceptance Criteria: Any cracking is evaluated in accordance with IWB-3100 by comparing inspection results with the acceptance standards of IWB-3400 and IWB-3500. All cracks found in the CRDRL nozzles are to be removed by grinding.

The applicant states, in the NMP ALRA, that each of these exceptions has been evaluated and the determination made that the applicant’s CRDRL Nozzle Program adequately manages the effects of aging on the CRDRL. The applicant has evaluated each of these exceptions and determined that its CRDRL Nozzle Program is consistent with GALL AMP XI.M6. On the basis of its review of operating experience for the applicant's BWR Control Rod Drive Return Line (CRDRL) Nozzle Program (see Section 2.32.5 below), the project team finds this exception to be acceptable.

2.32.4 Enhancements

None

2.32.5 Operating Experience

The applicant states, in the NMP ALRA, that ultrasonic examinations of the NMP Unit 1 CRDRL nozzle performed during refueling outages using automated test equipment qualified in accordance with Appendix VIII to ASME Section XI, Division 1, 1995 Edition with the 1996 Addenda, found no indications. The ultrasonic examination using automated test equipment has been demonstrated to be capable of reliably detecting flaws greater than or equal to a 0.25 inch depth. No industry experience was identified to suggest that existing programs and practices will not be effective in the timely identification of CRDRL nozzle cracking.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant's BWR Control Rod Drive Return Line (CRDRL) Nozzle Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.32.6 UFSAR Supplement

The applicant provides its UFSAR Supplement for the BWR Control Rod Drive Return Line (CRDRL) Nozzle Program in NMP ALRA, Appendix A, Section A1.1.39 for NMP Unit 1, which states that its BWR Control Rod Drive Return Line (CRDRL) Nozzle Program is an existing program that requires UT inspections of the CRDRL nozzle every 10 years to verify the nozzle is acceptable for continued service. A CRDRL crack growth fracture mechanics analysis was used to demonstrate the adequacy of the 10 year inspection frequency. The crack growth analyses are TLAAs that are managed in accordance with 10 CFR 54.21(c)(1)(iii) as described in Section 4.3.3.

The project team reviewed the UFSAR Supplement for NMP AMP B2.1.37, found that it was consistent with the GALL Report, and determined that it provides an adequate summary description of the program, as identified in the SRP-LR FSAR supplement table and as required by 10 CFR 54.21(d).

2.32.7 Conclusion

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, the project team has reviewed the exceptions and the associated justifications and determined that the AMP, with the exceptions is adequate to manage the aging effects/mechanisms for which it is credited. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR Supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.33 PROTECTIVE COATING MONITORING AND MAINTENANCE PROGRAM (NMP AMP B2.1.38)

In NMP ALRA, Appendix B, Section B2.1.38, the applicant states that NMP AMP B2.1.38, "Protective Coating Monitoring and Maintenance Program," is an existing plant program that is consistent with GALL AMP XI.S8, "Protective Coating Monitoring and Maintenance Program," with exceptions and enhancements.

2.33.1 Program Description

The applicant states, in the NMP ALRA, that this program is described in detail in the NMP Unit 1 and NMP Unit 2 responses to GL 98-04, "Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System after a Loss-Of-Coolant Accident because of Construction and Protective Coating Deficiencies and Foreign Material in Containment." The applicant's Protective Coating Monitoring and Maintenance Program was developed in accordance with ANSI N101.4-1972, "Quality Assurance for Protective Coatings Applied to Nuclear Facilities," referenced in RG 1.54, "Quality Assurance Requirements for Protective Coatings Applied to Water-Controlled Nuclear Power Plants," along with ANSI/ASME NQA-1-1983, "Quality Assurance Program Requirements for Nuclear Facilities." The applicant's program is a "comparable program" as described in GALL AMP XI.S8, which is an acceptable AMP for license renewal.

The applicant also states, in the NMP ALRA, that this program applies to Service Level 1 protective coatings inside the NMP Unit 1 primary containment and items within the torus (outside surface of the vent (ring) header and downcomer, inside surface of the vent piping, ring header, vent header junctions, and downcomers) and the NMP Unit 2 primary containment. The NMP Unit 2 suppression pool (wetwell) is not included because it is primarily stainless steel and does not have Service Level 1 coatings. Coating conditions monitored by this program include blistering, cracking, peeling, loose rust, and physical/mechanical damage. When localized degradation of a coating is identified, the affected area is evaluated by engineering and is scheduled for repair, replacement, or removal, as needed. The condition assessments and resulting repair, replacement, or removal activities ensure that the amount of coatings subject to detachment from the substrate during a loss of coolant accident (LOCA) is minimized to ensure post-accident operability of the ECCS suction strainers.

In addition, the applicant states, in the NMP ALRA, that for NMP Unit 1, the procurement, application, and inspection of new coatings and the repair and replacement of existing coatings are subject to the requirements of ANSI N101.4-1972 and ANSI/ASME NQA-1-1983 as discussed above. Coating condition assessments are conducted every refueling outage and include Service Level 1 coatings inside the primary containment and areas inside the torus such as the vent header and downcomer.

Furthermore, the applicant states, in the NMP ALRA, that for NMP Unit 2, monitoring and maintaining protective coatings inside the primary containment are also subject to the requirements of ANSI N101.2-1972, “Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities,” ANSI N101.4-1972, ANSI N5.12-1974, “Protective Coatings (Paints) for the Nuclear Industry,” RG 1.54, and ANSI/ASME NQA-1-1983. Coating condition assessments of Service Level 1 coatings inside the primary containment (drywell) are also conducted every refueling outage.

2.33.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B2.1.38 is consistent with GALL AMP XI.S8, with exceptions and enhancements.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B2.1.38, including program basis document, LR-PBD-COATINGS, “Protective Coating Monitoring and Maintenance Program (Units 1 and 2),” which provides an assessment of the AMP elements' consistency with GALL AMP XI.S8. The project team also reviewed a letter from Niagara Mohawk Power Corporation to the U.S. Nuclear Regulatory Commission dated November 10, 1998 (Letter No. NMP1L 1380). The letter contained NMP responses to Generic Letter 98-04, “Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment.”

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B2.1.38 and associated basis documents against GALL AMP XI.S8 for consistency.

The project team reviewed those portions of the Protective Coating Monitoring and Maintenance Program for which the applicant claims consistency with GALL AMP XI.S8 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant’s Protective Coating Monitoring and Maintenance Program provides reasonable assurance that the amount of Service Level 1 coatings inside the NMP Unit 1 primary containment and on surfaces within the torus (outside surface of the vent (ring) header and downcomer, inside surface of the vent piping, ring header, vent header junctions, and downcomers) and inside the NMP Unit 2 primary containment that are subject to detachment from the substrate during a LOCA, is minimized to ensure post-accident operability of the ECCS suction strainers. The project team finds the applicant's Protective Coating Monitoring and Maintenance Program acceptable because it conforms to the recommended GALL AMP XI.S8, "Protective Coating Monitoring and Maintenance Program," with the exceptions and enhancements as described below.

2.33.3 Exceptions to the GALL Report

The applicant states, in the NMP ALRA, that an exception to the GALL Report program elements is as follows:

Elements: 2: Preventive Actions
10: Operating Experience
Exception: The NMP Unit 1 and NMP Unit 2 Protective Coating Monitoring and Maintenance Program is not credited in the NMP ALRA for the prevention of corrosion of carbon steel components in the containment.

The GALL Report identifies the following recommendations for the program elements associated with the first exception taken:

Preventive Actions: With respect to loss of material due to corrosion of carbon steel elements, this program is a preventive action.

Operating Experience: NRC Generic Letter 98-04 describes industry experience pertaining to coatings degradation inside containment and the consequential clogging of sump strainers. RG 1.54, Rev. 1, was issued in July 2000. Monitoring and maintenance of Service Level 1 coatings conducted in accordance with Regulatory Position C4 is expected to be an effective program for managing degradation of Service Level 1 coatings, and consequently an effective means to manage loss of material due to corrosion of carbon steel structural elements inside containment.

The applicant states, in the NMP ALRA, that its Protective Coating Monitoring and Maintenance Program is not credited in the license renewal application for the prevention of corrosion of carbon steel components in the containments. However, the program monitors for rust that is not intact because it is a potential debris source for ECCS suction strainers. Therefore, the applicant states in its program basis document, that only the operating experience pertaining to the degradation of coatings and their potential clogging of the ECCS strainers is relevant to license renewal.

The project team finds this exception acceptable because the applicant's Protective Coating Monitoring and Maintenance Program is indeed not credited in the amended license renewal application for the prevention of corrosion of carbon steel components in the NMP Unit 1 or NMP Unit 2 containment. Other NMP AMPs are credited in the amended license renewal application for the detection of loss of material by corrosion of carbon steel components in the NMP Unit 1 or NMP Unit 2 containment. The applicant's Protective Coating Monitoring and Maintenance Program is only credited in the amended license renewal application to ensure that the amount of coatings subject to detachment from the substrate during a LOCA is minimized to ensure post-accident operability of the ECCS suction strainers.

The applicant also states, in the NMP ALRA, that another exception to the GALL Report program elements is as follows:

Elements:	3: Parameters Monitored/Inspected 4: Detection of Aging Effects 5: Monitoring and Trending 6: Acceptance Criteria
Exception:	The Protective Coating Monitoring and Maintenance Program will be enhanced following the guidance within ASTM D 5163-05a, "Standard Guide for Establishing Procedures to Monitor the Performance of Coating Service Level 1 Coatings Systems in an Operating Nuclear Power Plant," instead of ASTM D 5163-96, "Standard Guide for Establishing Procedures to Monitor the Performance of Safety Related Coatings in an Operating Nuclear Power Plant," as specified in GALL AMP XI.S8.

The GALL Report identifies the following recommendations for the program elements associated with the second exception taken:

> Parameters Monitored/Inspected: Regulatory Position C4 in RG 1.54, Rev. 1, states that "ASTM D 5163-96 provides guidelines that are acceptable to the NRC staff for establishing an in-service coatings monitoring program for Service Level 1 coating systems in operating nuclear power plants..." ASTM D 5163-96, subparagraph 9.2, identifies the parameters monitored or inspected to be "any visible defects, such as blistering, cracking, flaking, peeling, rusting, and physical damage."
>
> Detection of Aging Effects: ASTM D 5163-96, paragraph 5, defines the inspection frequency to be each refueling outage or during other major maintenance outages as needed. ASTM D 5163-96, paragraph 8, discusses the qualifications for inspection personnel, the inspection coordinator and the inspection results evaluator. ASTM D 5163-96, subparagraph 9.1, discusses development of the inspection plan and the inspection methods to be used. It states, "A general visual inspection shall be conducted on all readily accessible coated surfaces during a walk-through. After a walk-through, thorough visual inspections shall be carried out on previously designated areas and on areas noted as deficient during the walk-through. A thorough visual inspection shall also be carried out on all coatings near sumps or screens associated with the Emergency Core Cooling System (ECCS)." This subparagraph also addresses field documentation of inspection results. ASTM D 5163-96, subparagraph 9.5, identifies instruments and equipment needed for inspection.
>
> Monitoring and Trending: ASTM D 5163-96 identifies monitoring and trending activities in subparagraph 6.2, which specifies a pre-inspection review of the

previous two monitoring reports, and in subparagraph 10.1.2, which specifies that the inspection report should prioritize repair areas as either needing repair during the same outage or postponed to future outages, but under surveillance in the interim period.

Acceptance Criteria: ASTM D 5163-96, subparagraphs 9.2.1 through 9.2.6, 9.3 and 9.4, contain guidance for characterization, documentation, and testing of defective or deficient coating surfaces. Additional ASTM and other recognized test methods are identified for use in characterizing the severity of observed defects and deficiencies. The evaluation covers blistering, cracking, flaking, peeling, delamination, and rusting. ASTM D 5163-96, paragraph 11, addresses evaluation. It specifies that the inspection report is to be evaluated by the responsible evaluation personnel, who prepare a summary of findings and recommendations for future surveillance or repair, including an analysis of reasons or suspected reasons for failure. Repair work is prioritized as major or minor defective areas. A recommended corrective action plan is required for major defective areas, so that these areas can be repaired during the same outage, if appropriate.

The applicant states, in the NMP ALRA, that the use of the guidance within ASTM D 5163-05a instead of ASTM D 5163-96 as specified in the GALL Report is acceptable because ASTM D 5163-05a is the most recently issued standard and incorporates the latest industry guidance on protective coatings. In addition, the applicant states in its program basis document, ASTM D 5163-05a will be utilized since this consensus standard was revised to correct previous errors embedded within the standard for qualification requirements as detailed below. The newer standard provides guidance on the qualification of the individual(s) performing the actual coatings condition assessment while the GALL Report referenced standard is silent on that particular qualification. The older standard requires the inspectors and inspection coordinator to be a Level II Coatings Inspector. This is an inappropriate requirement for the inspection coordinator since the Level II inspector requirement only needs to be invoked for those individuals ensuring compliance to 10 CFR 50 Appendix B Criterion IX (Special Processes). This would occur during the taking of coating film thickness readings (required when performing qualitative follow-up inspections) and during inspections that would occur while performing restoration of a coating system, but not during a condition assessment which the coordinator is facilitating.

The project team finds this exception acceptable because other than the improvement changes between ASTM D 5163-05a and ASTM D 5163-96 discussed above by the applicant in the NMP ALRA and its program basis document, the documents are essentially the same. A terminology paragraph has been added to ASTM D 5163-05a which shifts the paragraph numbering scheme by one. The individual element referenced in GALL AMP XI.S8 to the paragraph numbers in ASTM D 5163-96 would have a different paragraph number if they referenced ASTM D 5163-05a, but there is little or no change to the content of the ASTM standard other than discussed above.

The applicant also states, in the NMP ALRA, that a third exception to the GALL Report program element is as follows:

> Element: 6: Acceptance Criteria
> Exception: The Protective Coating Monitoring and Maintenance Program will vary the guidance within ASTM D 5163-05a, paragraph 10.2.2 and 10.2.3 in regards to the measurement of cracks and peeling coating. Rather, NMP will use visual methods to estimate the size of any defective areas.

The GALL Report identifies the following recommendation for the “acceptance criteria” program element associated with the third exception taken:

> ASTM D 5163-96, subparagraphs 9.2.1 through 9.2.6, 9.3 and 9.4, contain guidance for characterization, documentation, and testing of defective or deficient coating surfaces. Additional ASTM and other recognized test methods are identified for use in characterizing the severity of observed defects and deficiencies. The evaluation covers blistering, cracking, flaking, peeling, delamination, and rusting. ASTM D 5163-96, paragraph 11, addresses evaluation. It specifies that the inspection report is to be evaluated by the responsible evaluation personnel, who prepare a summary of findings and recommendations for future surveillance or repair, including an analysis of reasons or suspected reasons for failure. Repair work is prioritized as major or minor defective areas. A recommended corrective action plan is required for major defective areas, so that these areas can be repaired during the same outage, if appropriate.

The applicant states, in the NMP ALRA, that its Protective Coating Monitoring and Maintenance Program will vary the guidance within ASTM D 5163-05a, paragraph 10.2.2 and 10.2.3 in regards to the measurement of cracks and peeling coating. Rather, NMP will use visual methods to estimate the size of any defective areas. Once an area has been identified that has cracks, peeling, or delaminated coating, visual estimation techniques will be used to quantify the surface area. Conservative estimates will be made using known structural dimensions. This is acceptable for the purposes of quantifying the total amount of degraded coatings.

The applicant makes reference to ASTM D 5163-05a, paragraphs 10.2.2 and 10.2.3 for the subject of this exception. The applicant has made an exception to use ASTM D 5163-05a instead of ASTM D 5163-96, which is discussed above in the second exception.

The project team finds that the applicant’s explanation for the exception acceptable in that taking definitive measurements of cracking, peeling, or delaminated coatings in the NMP Unit 1 and NMP Unit 2 containments is an unnecessary burden which adds no value. Once a coatings area has been identified as degraded, an experienced coatings person can use visual estimation techniques to quantify the square footage. Conservative estimates of the size of these areas will result in a conservative total amount of degraded coatings. The conservative total amount of degraded coatings can then be compared to the total amount of permitted degraded coatings such that the post-accident operability of the ECCS suction strainers is ensured. By making a conservative estimate of the amount of degraded coatings, more actual margin is assured for ECCS suction strainer operability. Should the conservative estimate of degraded coatings exceed the permitted amount, more definitive measurements could then be taken or coating repairs immediately undertaken.

On the basis that no credit for coatings is taken in the prevention of corrosion, the use of ASTM D 5163-05a instead of ASTM D 5163-96 is based on improvements to the document, visual estimation techniques are conservative, and its review of operating experience for the applicant's Protective Coating Monitoring and Maintenance Program (see Section 2.33.5 below), the project team finds these exceptions to be acceptable.

2.33.4 Enhancements

The applicant states, in the NMP ALRA, that an enhancement in meeting the GALL Report program elements is as follows:

Elements:	3: Parameters Monitored/Inspected 4: Detection of Aging Effects 5: Monitoring and Trending 6: Acceptance Criteria
Enhancement:	Program administrative controls will be enhanced to incorporate specific details consistent with requirements in ASTM D 5163-05a. (Commitment 34 for NMP Unit 1 and Commitment 32 for NMP Unit 2).

The GALL Report identifies the following respective recommendations for the program elements associated with the enhancement:

> Parameters Monitored/Inspected: Regulatory Position C4 in RG 1.54, Rev. 1, states that "ASTM D5163-96 provides guidelines that are acceptable to the NRC staff for establishing an in-service coatings monitoring program for Service Level 1 coating systems in operating nuclear power plants..." ASTM D 5163-96, subparagraph 9.2, identifies the parameters monitored or inspected to be "any visible defects, such as blistering, cracking, flaking, peeling, rusting, and physical damage."
>
> Detection of Aging Effects: ASTM D 5163-96, paragraph 5, defines the inspection frequency to be each refueling outage or during other major maintenance outages as needed. ASTM D 5163-96, paragraph 8, discusses the qualifications for inspection personnel, the inspection coordinator and the inspection results evaluator. ASTM D 5163-96, subparagraph 9.1, discusses development of the inspection plan and the inspection methods to be used. It states, "A general visual inspection shall be conducted on all readily accessible coated surfaces during a walk-through. After a walk-through, thorough visual inspections shall be carried out on previously designated areas and on areas noted as deficient during the walk-through. A thorough visual inspection shall

also be carried out on all coatings near sumps or screens associated with the Emergency Core Cooling System (ECCS)." This subparagraph also addresses field documentation of inspection results. ASTM D 5163-96, subparagraph 9.5, identifies instruments and equipment needed for inspection.

Monitoring and Trending: ASTM D 5163-96 identifies monitoring and trending activities in subparagraph 6.2, which specifies a pre-inspection review of the previous two monitoring reports, and in subparagraph 10.1.2, which specifies that the inspection report should prioritize repair areas as either needing repair during the same outage or postponed to future outages, but under surveillance in the interim period.

Acceptance Criteria: ASTM D 5163-96, subparagraphs 9.2.1 through 9.2.6, 9.3 and 9.4, contain guidance for characterization, documentation, and testing of defective or deficient coating surfaces. Additional ASTM and other recognized test methods are identified for use in characterizing the severity of observed defects and deficiencies. The evaluation covers blistering, cracking, flaking, peeling, delamination, and rusting. ASTM D5163-96, paragraph 11, addresses evaluation. It specifies that the inspection report is to be evaluated by the responsible evaluation personnel, who prepare a summary of findings and recommendations for future surveillance or repair, including an analysis of reasons or suspected reasons for failure. Repair work is prioritized as major or minor defective areas. A recommended corrective action plan is required for major defective areas, so that these areas can be repaired during the same outage, if appropriate.

The applicant states, in the NMP ALRA, that its Protective Coating Monitoring and Maintenance Program administrative controls will be enhanced to specify the visual examination of coated surfaces for any visible defects including blistering, cracking, flaking, peeling, and physical or mechanical damage. Also program administrative controls will be enhanced to: (1) perform periodic inspection of coatings every refueling outage versus every 24 months; (2) set minimum qualifications for inspection personnel, the inspection coordinator, and the inspection results evaluator; (3) perform thorough visual inspections in areas noted as deficient concurrently with the general visual inspection; and (4) specify the types of instruments and equipment that may be used for the inspection. In addition, program administrative controls will be enhanced to require: (1) pre-inspection reviews of the previous two monitoring reports before performing the condition assessment; (2) establishment of guidelines for prioritization of repair areas and monitoring these areas until they are repaired. Finally, the program administrative controls will be enhanced to require that the inspection results evaluator determine which areas are unacceptable and initiate corrective action.

The project team determined that enhancing the administrative controls for the applicant's Protective Coating Monitoring and Maintenance Program to be consistent with the specific GALL Report referenced recommendations of ASTM D 5163-96 (now ASTM D 5163-05a after exception) will be adequate to ensure the amount of Service Level 1 coatings inside the NMP Unit 1 primary containment and on surfaces within the torus (outside surface of the vent (ring) header and downcomer, inside surface of the vent piping, ring header, vent header junctions, and downcomers) and inside the NMP Unit 2 primary containment that are subject to detachment from the substrate during a LOCA, is minimized to ensure post-accident operability of the ECCS suction strainers. In addition, the project team finds that by revising the program administrative controls for these specific items, the program will be consistent with the recommendations in GALL AMP XI.S8 when considering the exception to the use of the 1996 Edition of ASTM D 5163. On the basis that adding these specific administrative controls will bring the applicant’s program into agreement with GALL AMP XI.S8, the project team finds this enhancement acceptable, as such changes to the applicant’s program will provide additional assurance that the effects of aging will be adequately managed.

2.33.5 Operating Experience

The applicant states, in the NMP ALRA, that it has implemented a Protective Coating Monitoring and Maintenance Program consistent with the response to GL 98-04. The response to GL 98-04 described program attributes, including design and licensing basis, procurement, control of coating application, quality assurance, monitoring, and maintenance of Service Level 1 coatings. Industry operating experience events pertaining to Service Level 1 coatings are evaluated for applicability to NMP. If determined to be applicable, these events are entered into the applicant’s Corrective Action Program for determining any required corrective or preventive actions.

The project team also reviewed the summary of specific operating experience provided in the applicant’s program basis document. The project team finds that the applicant’s existing Protective Coating Monitoring and Maintenance Program has been effective in identifying degraded coatings at various areas within the NMP Unit 1 and NMP Unit 2 primary containments during refueling outages. To find some areas of degraded coatings in containments during refueling outages is typical of industry experience. Once the degraded coating areas were identified, the applicant’s corrective action program then either removed the degraded coatings, repaired the degraded coatings or deferred repairing the degraded coatings until later while always maintaining the total amount of degraded coatings below the permitted amount of coatings subject to detachment from the substrate during a LOCA to ensure post-accident operability of the ECCS suction strainers.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant’s Protective Coating Monitoring and Maintenance Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.33.6 UFSAR and USAR Supplements

The applicant provides its UFSAR Supplement for the Protective Coating Monitoring and Maintenance Program in NMP ALRA, Appendix A, Section A1.1.40 for NMP Unit 1, which states that its Protective Coating Monitoring and Maintenance Program is an existing program that is described in the NMP Unit 1 response to GL 98-04. This program applies to Service Level 1 protective coatings inside the primary containment and items within the torus (outside surface of the vent (ring) header and downcomer, inside surface of the vent piping, ring header, vent header junctions, and downcomers). The condition assessments and resulting repair, replacement, or removal activities ensure that the amount of coatings subject to detachment from the substrate during a LOCA is minimized to ensure post-accident operability of the ECCS suction strainers. The applicant's Protective Coating Monitoring and Maintenance Program takes exception to certain GALL AMP XI.S8 evaluation elements, in that it is not credited for prevention of corrosion of carbon steel, the program will be enhanced following the guidance within ASTM D 5163-05a, and measurements of cracks, peeling, or delaminated coatings will be estimated via visual methods.

Planned program enhancements include the following:

- Specifying the visual examination of coated surfaces for any visible defects including blistering, cracking, flaking, peeling, and physical or mechanical damage.
- Performance of periodic inspection of coatings every refueling outage versus every 24 months.
- Setting minimum qualifications for inspection personnel, the inspection coordinator, and the inspection results evaluator.
- Performing the thorough visual inspection and areas noted as deficient along with the general visual inspection.
- Specifying the types of instruments and equipment that may be used for the inspection.
- Requiring pre-inspection reviews of the previous two monitoring reports before performing the condition assessment.
- Establishing guidelines for prioritization of repair areas and monitoring these areas until they are repaired.
- Requiring that the inspection results evaluator determine which areas are not acceptable and initiate corrective action.

Enhancements will be completed prior to the period of extended operation.

In addition, the applicant provides its USAR Supplement for the Protective Coating Monitoring and Maintenance Program in NMP ALRA, Appendix A, Section A2.1.38 for NMP Unit 2, which states that the NMP Unit 2 Protective Coating Monitoring and Maintenance Program is an existing program that is described in the NMP Unit 2 response to GL 98-04. This program applies to Service Level 1 protective coatings inside the primary containment. The NMP Unit 2 suppression pool (wetwell) is not included because it is primarily stainless steel and does not have Service Level 1 coatings. The condition assessments and resulting repair, replacement, or removal activities ensure that the amount of coatings subject to detachment from the substrate during a LOCA is minimized to ensure post-accident operability of the ECCS suction strainers. The applicant's Protective Coating Monitoring and Maintenance Program takes exception to certain GALL AMP XI.S8 evaluation elements, in that it is not credited for prevention of corrosion of carbon steel, the program will be enhanced following the guidance within ASTM D 5163-05a, and measurements of cracks, peeling, or delaminated coatings will be estimated via visual methods.

Planned program enhancements include the following:

- Specifying the visual examination of coated surfaces for any visible defects including blistering, cracking, flaking, peeling, and physical or mechanical damage.

- Performance of periodic inspection of coatings every refueling outage versus every 24 months.

- Setting minimum qualifications for inspection personnel, the inspection coordinator, and the inspection results evaluator.

- Performing the thorough visual inspection and areas noted as deficient along with the general visual inspection.

- Specifying the types of instruments and equipment that may be used for the inspection.

- Requiring pre-inspection reviews of the previous two monitoring reports before performing the condition assessment.

- Establishing guidelines for prioritization of repair areas and monitoring these areas until they are repaired.

- Requiring that the inspection results evaluator determine which areas are not acceptable and initiate corrective action.

Enhancements will be completed prior to the period of extended operation.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B2.1.38, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.33.7 Conclusion

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. In addition, the project team has reviewed the exceptions and the associated justifications and determined that the AMP, with the exceptions is adequate to manage the aging effects/mechanisms for which it is credited. Also, the project team has reviewed the enhancements and determined that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.34 WOODEN POWER POLE INSPECTION PROGRAM (NMP Unit 2 Only) (NMP AMP B2.1.40)

In NMP ALRA, Appendix B, Section B2.1.40, the applicant describes NMP AMP B2.1.40, "Wooden Power Pole Inspection Program."

The applicant states that NMP AMP B2.1.40 is a new plant-specific program (Commitment 34 for NMP Unit 2) that manages the aging of wooden power poles that are within the scope of license renewal because they provide structural support for the transmission lines in the recovery path for station blackout. Qualified personnel perform inspections, conducted prior to the period of extended operation and every 10 years thereafter, that manage material loss, degradation, and physical damage. Activities include visual inspections of the entire structure, including cross members and hardware, pole soundings, circumferential measurements, and below grade inspections. If necessary, core boring, application of preservatives, and pesticide treatments are performed if soundings suggest degradation has occurred. Corrective actions may include pole reinforcement or replacement. The program inspection activities ensure that within the scope of license renewal electrical support structures retain their intended functions between inspection cycles.

The project team reviewed, in whole or in part, the document listed in Attachment 5 of this audit and review report for NMP AMP B2.1.40 and interviewed the applicant's technical staff.

It is the understanding of the project team that the applicant's Wooden Power Pole Inspection Program is a sub-program of its Structures Monitoring Program. In Appendices A and B of the NMP ALRA for the applicant's Masonry Wall Program, which is also a sub-program of its Structures Monitoring Program, this relationship is addressed. In NMP ALRA Section A2.1.40 and NMP AMP B2.1.40 for the Wooden Power Pole Program, this relationship with the applicant's Structures Monitoring Program is not addressed. During the audit and review, the applicant was asked to explain the inconsistency.

In a letter dated December 1, 2005, the applicant states that NMP ALRA Section A2.1.40 is modified by adding the following at the end of the first paragraph: "The Wooden Power Pole Inspection Program is implemented by the Structures Monitoring Program for managing specific aging effects." Also, the applicant states that NMP AMP B2.1.40 is modified by adding the following to the end of the program description paragraph: "The Wooden Power Pole Inspection Program is implemented by the Structures Monitoring Program (B2.1.28) for managing specific aging effects."

The project team reviewed the applicant's response and finds it acceptable. With the clarification statements added above by the applicant to NMP ALRA Section A2.1.40 and NMP AMP B2.1.40, the relationship between its Wooden Power Pole Inspection Program and its Structures Monitoring Program is addressed.

2.34.1 Review of the AMP Against the Program Elements

The project team reviewed NMP AMP B2.1.40 against the AMP elements found in SRP-LR, Appendix A.1, Section A.1.2.3 and SRP-LR Table A.1-1. The project team followed the reviewed process as described in the NMP audit and review plan.

2.34.1.1 Scope of Program

The "scope of program" program element criterion in Appendix A.1.2.3.1 of the SRP-LR requires that the program scope include the specific structures and components addressed with this program.

The applicant states in NMP AMP B2.1.40, for the "scope of program" program element, that this program applies to wooden power poles relied upon for recovery from station blackout that have been identified to be within the scope of license renewal and are subject to aging management review. The program will include visual inspections of the entire structure, pole sounding and circumference measurements, below grade inspections, any necessary core boring, preservative application, and pesticide treatments.

The project team determined that the specific components for which the program manages aging effects/mechanisms are identified, which satisfies the criterion defined in Appendix A.1.2.3.1 of the SRP-LR. On this basis, the project team finds the applicant's scope of program acceptable.

2.34.1.2 Preventive Actions

The "preventive actions" program element criterion in Appendix A.1.2.3.2 of the SRP-LR is that condition monitoring programs do not rely on preventive actions, and thus, preventive actions need not be provided.

The applicant states in NMP AMP B2.1.40, for the “preventive actions” program element, that this program is a condition monitoring program as described in Appendix A.1.1 of the SRP-LR. The program will provide for timely detection of loss of material and degradation, and physical damage and does not support preventive or mitigating actions.

During the audit and review, the project team noted that in NMP ALRA (Page B2-89) under Scope of Program for NMP AMP B2.1.40, it is stated: The program will include visual inspections of the entire structure, pole sounding and circumference measurements, below grade inspections, any necessary core boring, preservative application, and pesticide treatments. However, the applicant states in the preceding paragraph above that the Wooden Power Pole Inspection Program is a condition monitoring program and does not support preventive or mitigating actions. The applicant was asked to explain how the application of preservative is not a preventive action and pesticide treatments are not mitigating actions.

In a letter dated December 1, 2005, the applicant states that the application of preservatives and pesticide treatments will enhance the life of the poles by minimizing their deterioration, however; the license renewal aging management program is not based on these actions and does not take credit for them. The aging management is a condition monitoring program. The inspection frequency, repair and or replacement of the poles are based on the condition of the poles at the time of inspection.

The project team reviewed the applicant’s response and finds it acceptable. While the application of preservatives and pesticides to the wooden power poles is part of the Wooden Power Pole Inspection Program, license renewal aging management is not based on these actions. For any one pole in particular, decreasing the inspection frequency to less than ten years and repairing or replacing it is based on the condition of the pole at the time of the condition monitoring inspection. The application of preservatives and/or pesticides are not relied upon to prevent aging effects/mechanisms of the wooden power poles under license renewal.

The project team determined that the preventive actions program element satisfies the criterion defined in Appendix A.1.2.3.2 of the SRP-LR. The project team finds that the applicant’s Wooden Power Pole Inspection Program is indeed only an inspection program and the inspections performed under this program will only monitor the condition of the wooden power poles and will not perform any preventive or mitigating action for aging effects/mechanisms. On this basis, the project team finds the applicant's preventive actions acceptable.

2.34.1.3 Parameters Monitored/Inspected

The relevant “parameters monitored or inspected” program element criteria in Appendix A.1.2.3.3 of the SRP-LR are:

> The parameters to be monitored or inspected should be identified and linked to the degradation of the particular structure and component intended function(s).

> The parameter monitored or inspected should detect the presence and extent of aging effects/mechanisms.

The applicant states in NMP AMP B2.1.40, for the “parameters monitored or inspected” program element, that wooden power poles will be inspected for material loss, degradation, and physical damage. Techniques include visual examinations of the entire structure, including cross members and hardware, pole soundings, circumferential measurements, and below grade inspections. If necessary, core boring, preservative applications, and pesticide treatments are performed if soundings suggest degradation has occurred. Visual inspections will check the pole for physical or mechanical damage that can limit/affect the life of the pole (lean or tilt, splitting or cracked tops, changes to grade, and shell or butt rot and decay). Excavations will be performed to a depth of approximately 18" to detect loss of material and/or material degradation or damage. Pole sounding will be performed by a qualified inspector at various pole locations to detect internal rot/decay, insect damage or infestations, or hollow areas. Core boring of the pole may be performed based on the inspection and sounding results to detect internal decay, insect infestation, or hollow voids. If insect infestation is found, the area will be treated with a fumigant prior to plugging the bored core region. Preservative treatment of the excavated surfaces (include moisture barrier/wrapping) will also be performed prior to recovering. Effective circumference measurements evaluate the pole loading capacity.

The program also monitors proper pole tagging and labeling requirements, which contain treatment information and application dates.

The project team determined that the parameters monitored/inspected program element satisfies the criterion defined in Appendix A.1.2.3.3 of the SRP-LR. The project team finds that the applicant has clearly identified the parameters of wooden power poles which need to be inspected to determine if aging effects/mechanisms have occurred to the extent that the degradation will affect the ability of the wooden power poles to perform their intended function. Visual examinations of the entire wooden power pole structure, with core boring and soundings as needed, will be performed to check each pole for physical or mechanical damage that can limit or affect the life of the pole. Parameters monitored include: lean or tilt, splitting or cracked tops, changes to buried depth, shell or butt rot or decay, internal rot/decay, insect damage or infestations, circumferential measurements and hollow voids. On this basis, the project team finds the applicant's parameters monitored or inspected acceptable.

2.34.1.4 Detection of Aging Effects

The relevant “detection of aging effects” program element criteria in Appendix A.1.2.3.4 of the SRP-LR are:

> Provide information that links the parameters to be monitored or inspected to the aging effects/mechanisms being managed.
>
> Describe when, where, and how program data are collected (i.e., all aspects of activities to collect data as part of the program).

> Link the method or technique and frequency, if applicable, to plant-specific or industry-wide operating experience.
>
> Provide the basis for the inspection population and sample size when sampling is used to inspect a group of SCs. 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/mechanisms.

The applicant states in NMP AMP B2.1.40, for the “detection of aging effects” program element, that the inspections outlined in the new program shall be completed by qualified personnel on within the scope of license renewal components within five years of the expiration of the current operating license. Subsequent visual inspections and testing for the wooden poles will be performed every ten years. This frequency is based on industry experience, which has shown that although the typical wooden pole life is expected to be 30-40 years, routine inspection and treatment can extend this life by 50% or more. Typical industry inspection frequencies for wooden poles currently range from 8-15 years.

The 10-year visual inspections and testing will detect degradation and identify deficiencies before there is a loss of intended function(s). All inspections will provide the level of detail and examination necessary to ensure that intended functions are preserved through each subsequent inspection cycle.

The project team determined that this program element satisfies the criteria defined in Appendix A.1.2.3.4 of the SRP-LR. The project team finds that the applicant has clearly identified the frequency of inspection of the wooden power poles as within five years of the expiration of the current operating license and every 10 years after. This frequency is based on industry experience. Every wooden power pole within the scope of license renewal will be inspected. Visual examinations of the entire wooden power pole structure, with core boring and soundings as needed, are adequate methods to gather data on the condition of the wooden power poles. On this basis, the project team finds the applicant's detection of aging effects acceptable.

2.34.1.5 Monitoring and Trending

The relevant “monitoring and trending” program element criteria in Appendix A Section A.1.2.3.5 of the SRP-LR are:

> 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.
>
> This program element describes how the data collected are evaluated and may also include trending for a forward look. The parameter or indicator trended should be described.

The applicant states in NMP AMP B2.1.40, for the "monitoring and trending" program element, that this program shall detail the retention of all previous inspection results and records. These records are identified as plant records and available for review during the subsequent inspection cycle. Reviews of previous inspection results will provide for trending of long-term degradation or deterioration. This information could also help in evaluating the potential for degradation during the period before the next inspection cycle.

Additionally, the program shall provide direction for appropriate engineering reviews of the completed inspection results. Although the inspections may be performed by an outside vendor or contractor or by the applicant's personnel, in-house reviews of the results shall be performed to confirm that the wooden poles are capable of continuing to perform their intended functions through the next inspection cycle.

The project team determines that for visual inspection, this program element satisfies the criteria defined in Appendix A.1.2.3.5 of the SRP-LR. The project team finds that the applicant intends to retain all inspection results and records under its Wooden Power Pole Inspection Program. Reviews of previous inspection results will be done prior to performing additional pole inspections so that long-term degradation can be trended. In-house reviews of the results shall be performed by the applicant to confirm that the wooden poles are capable of continuing to perform their intended functions through the next inspection cycle. On this basis, the project team finds the applicant's monitoring and trending acceptable.

2.34.1.6 Acceptance Criteria

The key "acceptance criteria" program element criteria in Appendix A.1.2.3.6 of the SRP-LR are:

> The acceptance criteria of the program and its basis should be described. The acceptance criteria, against which the need for corrective actions will be evaluated, should ensure that the SC intended function(s) are maintained under all CLB design conditions during the period of extended operation.
>
> The program should include a methodology for analyzing the results against applicable acceptance criteria.
>
> 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.

The applicant states in NMP AMP B2.1.40, for the "acceptance criteria" program element, that this program will detail qualification and experience requirements for personnel performing the inspections, where experience in the inspection, treatment, and reinforcement of wooden power poles is required. If the inspections are contracted to an outside vendor or contractor, the activity identifies all required personnel qualifications, including minimum years of experience, licensed pesticide applicator certifications, and wood treatment and fumigant qualifications. All work performed by the applicant or a vendor/contractor shall be noted as being performed to the criteria and/or standards stated in the NMP activity and through site specific, approved procedures.

Additionally, the program will detail the inspection methods with any applicable acceptance/rejection criteria. Any pole found to have loss of material or degradation, or physical damage will be assessed and treated. The capability of a degraded pole to continue performing load carrying intended functions will be evaluated. Additionally, the program will identify and label wooden poles warranting either immediate rejection due to dangerous conditions, as well as those with serious but lesser defects requiring repair, reinforcement, or non-emergent replacement. All poles that have been classified as 'rejected' or 'danger' shall be immediately labeled or tagged during the inspection denoting the severity level of degradation.

The project team reviewed this program element to determine whether or not it satisfies the criteria defined in Appendix A.1.2.3.6 of the SRP-LR. The project team finds that the applicant intends under its Wooden Power Pole Inspection Program to detail the inspection methods and any applicable acceptance/rejection criteria. In addition, detailed qualification and experience requirements will be developed for personnel performing the inspections. The inspection results will be used to evaluate the capability of a degraded pole to continue performing its load carrying intended functions. On this basis, the project team finds the applicant's acceptance criteria acceptable.

2.34.1.7 Corrective Actions

The adequacy of the applicant's 10 CFR 50, Appendix B Program associated with this program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the NMP ALRA.

The applicant states, in the NMP ALRA, that the Quality Assurance Program Topical Report documents its commitment to the corrective action criteria of 10 CFR 50, Appendix B. The applicant’s Wooden Power Pole Inspection Program will direct the use of the site corrective action program when conditions adverse to quality are identified. These actions include evaluations of adverse or degraded conditions and wooden pole reinforcement or replacement.

The project team reviewed other aspects of this program element to determine whether or not it satisfies the criteria defined in Appendix A.1.2.3.7 of the SRP-LR. The project team finds that the applicant intends to take corrective action when conditions adverse to wooden power pole quality exist by performing evaluations and/or wooden pole reinforcement or replacement. On this basis, the project team finds the applicant's corrective actions acceptable.

2.34.1.8 Confirmation Process

The adequacy of the applicant's 10 CFR 50, Appendix B Program associated with this program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the NMP ALRA.

The applicant states, in the NMP ALRA, that the Quality Assurance Program Topical Report documents the confirmation process for it under the corrective action criterion. The applicant's confirmation process is implemented through Corrective Action Effectiveness Reviews and is performed for significant conditions adverse to quality and selected hardware related conditions adverse to quality. The applicant's Corrective Action Program includes, but is not limited to, safety-related, non-safety related and fire protection SSCs. Therefore, those SSCs required to be within the scope of license renewal are addressed as part of the applicant's current corrective action program.

The project team reviewed other aspects of this program element to determine whether or not it satisfies the criteria defined in Appendix A.1.2.3.8 of the SRP-LR. The project team finds that the applicant's confirmation process is implemented through Corrective Action Effectiveness Reviews and is performed for significant conditions adverse to quality and selected hardware related conditions adverse to quality. On this basis, the project team finds the applicant's confirmation process acceptable.

2.34.1.9 Administrative Controls

The adequacy of the applicant's 10 CFR 50, Appendix B Program associated with this program element is reviewed by the NRR DIPM staff and addressed in Section 3 of the SER related to the NMP ALRA.

The applicant states, in the NMP ALRA, that its Wooden Power Pole Inspection Program will be implemented through department administrative procedures which are subject to the 10 CFR 50 Appendix B administrative controls program. The administrative controls for NMP are discussed in its Conduct of Operations description and the Quality Assurance Program Topical Report.

The project team reviewed other aspects of this program element to determine whether or not it satisfies the criteria defined in Appendix A.1.2.3.9 of the SRP-LR. The project team finds that the applicant's Wooden Power Pole Inspection Program has regulatory and administrative controls which provide a formal review and approval process of the program. On this basis, the project team finds the applicant's administrative controls acceptable.

2.34.1.10 Operating Experience

The "operating experience" program element criterion in Appendix A.1.2.3.10 of the SRP-LR states that operating experience 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.

The applicant states, in the NMP ALRA, for the "operating experience" program element, that the program is defined and implemented for license renewal, thus no plant-specific operating experience currently exists. A review of the corrective action process reports yielded no reports applicable to wooden pole aging or degradation. Inspection scheduling and performance, as discussed in the other SRP-LR program elements, will provide plant-specific inspection data and experience prior to the end of the current operating license. These results and the AMP experience, along with industry experience, will provide timely awareness of emerging aging issues as well as provide a basis for evaluating the program effectiveness and the need for program adjustments.

The project team recognizes that the applicant's corrective action program, which captures internal and external plant operating experience issues, will ensure that operating experience is reviewed and incorporated in the future to provide objective evidence to support the conclusion that the effects of aging are adequately managed.

On the basis of the above two paragraphs and discussions with the applicant's technical staff, the project team concludes that the applicant's Wooden Power Pole Inspection Program (NMP Unit 2 Only) will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.34.2 USAR Supplement

The applicant provides its USAR Supplement for the Wooden Power Pole Inspection Program (NMP Unit 2 Only) in NMP ALRA, Appendix A, Section A2.1.40, which states (after modification as discussed in Section 2.34 above) that its Wooden Power Pole Inspection Program (NMP Unit 2 Only) manages the aging of wooden electrical poles that are within the scope of license renewal for recovery from station blackout. Qualified personnel perform inspections to manage material loss and degradation, and physical damage of wooden poles prior to the period of extended operation and every 10 years thereafter. Activities include visual inspections of the entire structure, including cross members and hardware, pole sounding and circumference measurements, below grade inspections, any necessary core boring, preservative application, and pesticide treatments. Corrective actions may include pole reinforcement or replacement. The applicant's Wooden Power Pole Inspection Program inspection activities ensure that within the scope of license renewal electrical support structures retain their intended functions between inspection cycles. The applicant's Wooden Power Pole Inspection Program is implemented by its Structures Monitoring Program for managing specific aging effects/mechanisms.

The applicant's Wooden Power Pole Inspection Program is a new program that will be implemented prior to the period of extended operation.

The project team reviewed the USAR Supplement and determined that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.34.3 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the USAR Supplement for this program, the project team also finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.35 ENVIRONMENTAL QUALIFICATION PROGRAM (NMP AMP B3.1)

In the NMP ALRA, Appendix B, Section B3.1, the applicant states that NMP AMP B3.1, Environmental Qualification (EQ) Program is an existing plant program that is consistent with GALL AMP X.E1, "Environmental Qualification (EQ) of Electrical Components."

2.35.1 Program Description

The applicant states, in the NMP ALRA, that this program manages thermal, radiation, and cyclical aging for electrical equipment important to safety and located in harsh plant environments at NMP. At NMP Unit 2, the EQ Program also manages these effects for active safety-related mechanical equipment located in harsh plant environments. Program activities (1) identify applicable equipment and environmental requirements; (2) establish, demonstrate, and document the level of qualification (including configuration, maintenance, surveillance, and replacement requirements); and (3) maintain (or preserve) qualification. The applicant's EQ Program employs aging evaluations based on 10 CFR 50.49(f) qualification methods. Components in the applicant's EQ Program must be refurbished, replaced, or have their qualification extended prior to reaching the aging limits established in the evaluation. Aging evaluations for environmentally qualified components that specify a qualification of at least 40 years are considered time-limited aging analyses (TLAAs) for license renewal. The applicant's EQ Program ensures that these SSCs are maintained within the bounds of their qualification bases.

2.35.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B3.1 is consistent with GALL AMP X.E1.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B3.1, including the program basis document, "Unit 1 and 2 Environment Qualification Program Attribute Assessment," which provides an assessment of the AMP elements' consistency with GALL AMP X.E1.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B3.1 and associated basis documents against GALL AMP X.E1 for consistency.

During the audit and review, the project team identified one difference between the GALL AMP and the NMP AMP program description. The difference is addressed in the following paragraph.

The result of the environmental qualification of electrical equipment in NMP ALRA, Section 4.4 indicates that the aging effects/mechanisms of the EQ of electrical equipment identified in the time-limited aging analysis (TLAA) will be managed during the extended period of operation under 10 CFR 54.21(c)(1)(iii). However, no information is provided in NMP AMP B3.1 program basis document on the attribute of a reanalysis of an aging evaluation to extend the qualification life of electrical equipment identified in the TLAA. The important attributes of a reanalysis are the analytical methods, the data collection and reduction methods, the underlying assumptions, and the acceptance criteria and corrective actions. GALL AMP X.E1, under the EQ component reanalysis attributes, describes each attribute of a reanalysis under the program description. The NMP AMP does not include this information. During the audit and review, the project team requested that the applicant address the reanalysis attributes listed in GALL AMP X.E1 and include them in its program basis document or provide justification of why these attributes were not necessary. In response to this request, the applicant informed the project team that it agrees to include the detailed EQ component reanalysis attributes in its NMP AMP. The project team concludes that the applicant's response is acceptable because this will make it consistent with the GALL Report AMP's program description. In a letter dated December 1, 2005, the applicant revised its NMP ALRA to included the detailed description of reanalysis attributes.

During the audit and review, the project team also asked the applicant if it has plans to monitor temperature in order to extend the qualified life of EQ components, if that option is chosen. The applicant responded that recognizing that thermal aging limits are typically limiting from a component aging limit standpoint, it plans to incorporate actual plant temperature monitoring data into the aging evaluation reanalyzes for EQ components with a qualified life of greater than 40 years. This will be similar to the existing temperature monitoring data that was used to assess equipment qualified life during the current operation period, and will accurately represent existing plant thermal condition.

The project team reviewed those portions of the Environmental Qualification Program for which the applicant claims consistency with GALL AMP X.E1 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's Environmental Qualification Program provides reasonable assurance that monitoring or inspection of certain environment, conditions, or component parameters may be used to ensure that a component is within the bound of its qualification basis, or as a means to modify the qualification. The project team finds the applicant's Environmental Qualification Program acceptable because it conforms to the recommended GALL AMP X.E1, "Environmental Qualification (EQ) of Electrical Components."

2.35.3 Exceptions to the GALL Report

None

2.35.4 Enhancements

None

2.35.5 Operating Experience

The applicant states, in the NMP ALRA, that its Environmental Qualification Program started in 1980 as a project at NMP Unit 1, and was developed as an integral part of construction at NMP Unit 2. Since its inception, consideration of plant and industry operating experience has been an important element of its EQ Program. Recorded measurements of ambient temperature have been used to define conditions for some harsh environments, and records of representative actual temperatures have been used as preliminary data to resolve concerns for certain terminal blocks installed in the NMP Unit 1 drywell. Qualified life evaluations for certain sealing materials and lamp assemblies were reevaluated to remove excess conservatism and eliminate unnecessary maintenance activities.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff to confirm that the plant-specific operating experience did not reveal any degradation not bounded by industry experience.

In addition, the applicant states, in the NMP ALRA, that its Environmental Qualification Program is continually adjusted to account for industry experience and research. Internal and external reviewers have frequently assessed the applicant’s EQ Program. The program has also evolved as administrative improvements were identified to address issues such as communication and organizational transitions. A major program reconstitution effort began in 2003 in response to internal assessments to improve the overall strength of the applicant’s EQ Program. As additional operating experience is obtained, lessons learned will be used to adjust this program as needed. The applicant’s EQ Program has been effective in managing thermal, radiation, and cyclical aging for components within the scope of 10 CFR 50.49.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant’s Environmental Qualification Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.35.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the Environmental Qualification Program in NMP ALRA, Appendix A, Section A1.1.15 for NMP Unit 1 and Section A2.1.15 for NMP Unit 2, respectively, which states that the 10 CFR 50.49 requires that certain safety-related and non-safety related electrical equipment remain functional during and after design basis events. To establish reasonable assurance that this equipment can function when exposed to postulated harsh environmental conditions, licensees are required to determined the equipment’s qualified life and to develop a program that mains the qualification of that equipment.

For components within the scope of the applicant’s EQ Program, analyses of thermal exposure, radiation exposure, and mechanical cycle aging that cannot be shown to remain valid for the period of extended operation will be projected to extend the qualification of components before reaching the aging limits established in the applicable evaluation, or the components will be refurbished or replaced.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B3.1, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.35.7 Conclusion

On the basis of its audit and review of the applicant's program, the project team finds that those portions of the program for which the applicant claims consistency with the GALL Report are consistent with the GALL Report. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

On the basis of its review of the UFSAR and USAR Supplements for this program, the project team finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

2.36 FATIGUE MONITORING PROGRAM (NMP AMP B3.2)

In NMP ALRA, Appendix B, Section B3.2, the applicant states that NMP AMP B3.2, "Fatigue Monitoring Program," is an existing plant program that is consistent with GALL AMP X.M1, "Metal Fatigue of Reactor Coolant Pressure Boundary," with enhancements.

2.36.1 Program Description

The applicant states, in the NMP ALRA, that this program is an existing program that manages the fatigue life of reactor coolant pressure boundary components by tracking and evaluating key plant events. Events were selected based upon plant-specific evaluations of the most fatigue-limited locations for critical components, including those discussed in NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components." The applicant's Fatigue Monitoring Program monitors operating transients to-date, calculates cumulative usage factors to-date, and directs performance of engineering evaluations to develop preventive and mitigative measures in order not to exceed the design limit on fatigue usage.

The applicant also states, in the NMP ALRA, that the effects of reactor coolant environment will be considered through the evaluation of, as a minimum, those components selected in NUREG/CR-6260 using the appropriate environmental fatigue factors.

In addition, the applicant states, in the NMP ALRA, that the design basis metal fatigue analyses for the reactor coolant pressure boundary and certain primary containment structures and components are considered TLAAs for license renewal. The applicant's Fatigue Monitoring Program provides an analytical basis for confirming that the number of cycles established by the analysis of record will not be exceeded before the end of the period of extended operation. In order to determine cumulative usage factors (CUFs) more accurately, the applicant's Fatigue Monitoring Program will implement FatiguePro fatigue monitoring software. This provides an analytical basis for confirming that the number of cycles established by the analysis of record will not be exceeded before the end of the period of extended operation.

2.36.2 Consistency with the GALL Report

In the NMP ALRA, the applicant states that NMP AMP B3.2 is consistent with GALL AMP X.M1, with enhancements.

The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report for NMP AMP B3.2, including "Program Attribute Assessment Unit 1 and 2 Fatigue Monitoring Program," which provides an assessment of the AMP elements' consistency with GALL AMP X.M1.

The project team also reviewed the program elements (see Section 1.5.1 of this audit and review report) contained in NMP AMP B3.2 and associated basis documents against GALL AMP X.M1 for consistency.

The project team reviewed those portions of the Fatigue Monitoring Program for which the applicant claims consistency with GALL AMP X.M1 and finds that they are consistent with the GALL Report AMP. Furthermore, the project team concludes that the applicant's Fatigue Monitoring Program, with the enhancements discussed below, provides reasonable assurance that the effects of fatigue will be adequately managed. The project team finds the applicant's Fatigue Monitoring Program acceptable because it conforms to the recommended GALL AMP X.M1, "Metal Fatigue of Reactor Coolant Pressure Boundary," with the enhancements as described below.

2.36.3 Exceptions to the GALL Report

None

2.36.4 Enhancements

The applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

Element:	2: Preventive Actions
Enhancement:	Revise applicable existing procedures to ensure that the procedures address the following:

> The Fatigue Monitoring Program will be enhanced with guidance for the use of the FatiguePro software package and updated methodology for environmental fatigue factors in establishing updated fatigue life calculations for components. (Commitment 5 for NMP Unit 1 and Commitment 4 for NMP Unit 2).

The GALL Report identifies the following recommendation for the “preventive actions” program element associated with the enhancement:

> Maintaining the fatigue usage factor below the design code limit and considering the effect of the reactor water environment, as described under the program description, will provide adequate margin against fatigue cracking of reactor coolant system components due to anticipated cyclic strains.

The applicant states, in the NMP ALRA, that the Fatigue Monitoring Program will provide guidance for the use of FatiguePro and methodology for calculation of environmental fatigue factors.

During the audit and review, the project team evaluated the applicant’s existing Fatigue Monitoring Program and noted that it had correctly identified the need for more sophisticated methods to demonstrate adequate margin to fatigue limits. Improved calculation of environmental fatigue factors is also necessary. The project team finds that the use of FatiguePro is an appropriate method to improve monitoring, and taken together with improved methodology for calculation of environmental fatigue factors, these enhancements provide assurance that fatigue damage will be adequately managed. On this basis, the project team finds this enhancement acceptable as such changes to the applicant’s program will provide additional assurance that the effects of aging will be adequately managed.

In addition, the applicant states, in the NMP ALRA, that the enhancement in meeting the GALL Report program element is as follows:

Element:	3: Parameters Monitored/Inspected
Enhancement:	Revise applicable existing procedures to ensure that the procedures address the following: Safety relief valve actuations will be added to the list of key plant events (transients) that are monitored for NMP Unit 1. (Commitment 9 for NMP Unit 1).

The GALL Report identifies the following recommendation for the “parameters monitored/inspected” program element associated with the enhancement:

> The program monitors all plant transients that cause cyclic strains, which are significant contributions to the fatigue usage factor. The number of plant transients that cause significant fatigue usage for each reactor coolant pressure

> boundary component is to be monitored. Alternatively, more detailed local monitoring of the plant transient may be used to compute the actual fatigue usage for each transient.

In the NMP ALRA, the applicant states that safety relief valve actuations will be added to the list of key plant events that are monitored for NMP Unit 1. (Such actuations are already monitored for NMP Unit 2). The acceptability of this enhancement is discussed by the NRC DE staff in Section 4 of the SER related to the NMP ALRA in the evaluation of RAI 4.6.2-1.

2.36.5 Operating Experience

The applicant states, in the NMP ALRA, that it has reviewed both industry and plant-specific operating experience relating to the Fatigue Monitoring Program. In instances where the potential existed to exceed CUFs before the end of plant life, the engineering analyses showed that actual margins were larger than initially estimated. A noteworthy result of these fatigue evaluations was the recognition that the applicant’s Fatigue Monitoring Program could benefit from the use of analytical fatigue software such as FatiguePro. DERs written in 2003 identified opportunities for programmatic improvement. This led to the establishment of a comprehensive Fatigue Monitoring Program document, additional reviews of cycle records with an emphasis on NMP Unit 1, and a proposal for the implementation of fatigue analysis software.

The applicant also states, in the NMP ALRA, that its Fatigue Monitoring Program is continually adjusted to account for industry experience and research. As additional operating experience is obtained, lessons learned will be used to adjust this program as needed.

The project team reviewed the operating experience provided in the NMP ALRA, and interviewed the applicant's technical staff. At NMP, there are components that are at or near the limit of the allowed cycle count established under the original TLAA. Evaluations confirm that for all locations, even the most limiting, significant margin remains to a CUF=1.0, and the implementation of the proposed program will enable the applicant to prevent exceeding that limit.

On the basis of its review of the above industry and plant-specific operating experience and discussions with the applicant's technical staff, the project team concludes that the applicant’s Fatigue Monitoring Program will adequately manage the aging effects/mechanisms that are identified in the NMP ALRA for which this AMP is credited.

2.36.6 UFSAR and USAR Supplements

The applicant provides its UFSAR and USAR Supplements for the Fatigue Monitoring Program in NMP ALRA, Appendix A, Section A1.1.16 for NMP Unit 1 and Section A2.1.16 for NMP Unit 2, respectively, which state that its Fatigue Monitoring Program is an existing program that manages the fatigue life of reactor coolant pressure boundary components by tracking and evaluating key plant events. The applicant’s Fatigue Monitoring Program monitors operating transients to date, calculates cumulative usage factors to date, and directs performance of engineering evaluations to develop preventive and mitigative measures in order not to exceed the design limit on fatigue usage.

The applicant's Fatigue Monitoring Program will be enhanced with guidance for the use of the FatiguePro software package and updated methodology for environmental fatigue factors in establishing updated fatigue life calculations for components, and to add safety relief valve actuations for NMP Unit 1 as a monitored transient. These enhancements will be completed prior to the period of extended operation.

The project team reviewed the UFSAR and USAR Supplements for NMP AMP B3.2, found that they were consistent with the GALL Report, and determined that they provide an adequate summary description of the program, as identified in the SRP-LR FSAR Supplement table and as required by 10 CFR 54.21(d).

2.36.7 Conclusion

On the basis of its review and audit of the applicant's program, the project team finds that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. Also, the project team has reviewed the enhancements and determined that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3). The project team also reviewed the UFSAR and USAR Supplements for this AMP and finds that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0 Aging Management Review Results

The project team's audit and review activities for the NMP AMR results and its conclusions regarding these reviews are documented in this section.

The project team determined that the AMR results reported by the applicant to be consistent with the GALL Report are consistent with the GALL Report. The project also determined that the plant-specific AMR results reported by the applicant to be justified on the basis of an NRC-approved precedent are technically acceptable and applicable. For AMR results for which the GALL Report recommends further evaluation, the project team reviewed the applicant's evaluation and determined that it adequately addresses the issues for which the GALL Report recommended further evaluation.

The AMR results that are within the scope of the project team are identified in Appendix D of the NMP audit and review plan. These AMR result line items reviewed by the project team in Chapter 3 of NMP ALRA Tables 3.X.2.A-Y (for Unit 1) and 3.X.2.B-Y (for Unit 2) were either consistent with the GALL Report or justified by the applicant on the basis of a previously approved position.

In NMP ALRA Tables 3.X.2.A-Y (for Unit 1) and 3.X.2.B-Y (for Unit 2), in addition to the notes, the applicant provided a summary of AMR results for the applicable systems, which included SCs, associated materials, environment, aging effect/mechanism requiring management, and an AMP for each line item. The notes describe how the information in the tables aligns with the information in the GALL Report. Those that are aligned with the GALL Report are assigned letters and are described below. Those defined by the applicant are assigned numbers and defined in its NMP ALRA.

Note A indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect/mechanism. In addition, the AMP is consistent with the AMP identified in the GALL Report.

Note B indicates that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect/mechanism. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The project team concluded that the identified exceptions to the GALL Report AMPs are acceptable.

Note C indicates that the component for the AMR line item is different, but consistent with the GALL Report for material, environment, and aging effect/mechanism. This note indicates that the applicant was unable to find a listing of some system components in the GALL Report. However, the applicant identified a different component in the GALL Report that had the same material, environment, aging effect/mechanism, and AMP as the component that was under review. The project team concluded that the AMR line item of the different component was applicable to the component under review.

Note D indicates that the component for the AMR line item is different, but consistent with the GALL Report for material, environment, and aging effect/mechanism. In addition, the AMP takes some exceptions to the AMP identified in the GALL Report. The project team reviewed these line items to verify consistency with the GALL Report. The project team concluded that the AMR line item of the different component was applicable to the component under review. The project team concluded that the identified exceptions to the GALL Report AMPs are acceptable.

Note E indicates that the AMR line item is consistent with the GALL Report for material, environment, and aging effect/mechanism, but a different AMP is credited. The project team evaluated these line items to determine that the AMP credited by the applicant is applicable.

Note F indicates that the material is not in the GALL Report for the identified component.

Note G indicates that the environment is not in the GALL Report for the identified component and material.

Note H indicates that the aging effect/mechanism is not in the GALL Report for component, material, and environment combination.

Note I indicates that the aging effect/mechanism in the GALL Report for the identified component, material, and environment combination is not applicable.

Note J indicates that neither the identified component nor the material and environment combination is evaluated in the GALL Report.

Discrepancies or issues discovered by the project team during the audit and review that required a response are documented in this audit and review report. If resolution of an issue was not resolved prior to issuing this audit and review report, a request for additional information (RAI) was prepared by the project team to solicit the information needed to disposition the issue. The RAI will be included and dispositioned in the SER related to the NMP ALRA. The list of RAIs associated with the audit and review report is provided in Attachment 4 to this audit and review report.

The project team conducted an audit and review of the information provided in the NMP ALRA and program basis documents, which are available at the applicant's engineering office, and through interviews with the NMP technical staff. On the basis of its audit and review, the project team found that the applicable aging effects/mechanisms were identified, the appropriate combination of materials and environments were listed, and acceptable AMPs were specified.

The AMR results of NMP ALRA Sections 3.1 through 3.6 reviewed by the project team are provided in the following sections.

3.1A NMP ALRA Unit 1 Section 3.1 - Aging Management of Reactor Vessel, Internals, and Reactor Coolant Systems

In NMP ALRA Section 3.1, the applicant provided the results of its AMRs for the reactor vessel, internals, and reactor coolant systems.

In NMP ALRA Tables 3.1.2.A-1 through 3.1.2.A-5, the applicant provided a summary of the AMR results for component types associated with the (1) reactor pressure vessel, (2) reactor pressure vessel internals, (3) reactor vessel instrumentation system, (4) reactor recirculation system, and (5) control rod drive system. The summary information for each component type included intended function; material; environment; aging effect/mechanism requiring management; AMPs; the GALL Report Volume 2 item; cross reference to NMP ALRA Table 3.1.1.A (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

For each component type in NMP ALRA Table 3.1.1.A, the applicant identified those component types that are managed in a manner consistent with the GALL Report, component types for which the GALL Report recommends further evaluation, and those AMRs that are not addressed in the GALL Report together with the method proposed for their aging management.

The project team conducted its audit and review in accordance with SRP-LR Section 3.1.3 and the NMP audit and review plan. The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report.

3.1A.1 Aging Management Review Results That Are Consistent with the GALL Report

For aging management evaluations that the applicant states are consistent with the GALL Report, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the NMP ALRA is acceptable.

The project team reviewed its assigned NMP ALRA line items to determine that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects/mechanisms have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects/mechanisms for the reactor vessel, internals, and reactor coolant system components that are subject to an AMR.

The following subparagraphs identify differences, when compared to the GALL Report, that were identified by the project team during the audit and review.

3.1A.1.1 Crack Initiation and Growth Due to SCC and/or IGSCC

In the discussion section of NMP ALRA Table 3.1.1.A, Item 3.1.1.A-22, the applicant states that NMP AMP B2.1.3, "Reactor Head Closure Studs Program," is credited for closure head studs and nuts that have an aging effect/mechanism of loss of material due to general corrosion. During the audit and review, the project team noted that NMP ALRA Table 3.1.1.A, Item 3.1.1.A-22 is applicable to the aging effect/mechanism of cracking and asked the applicant to provide clarification.

In a letter dated December 1, 2005, the applicant provided its response to revise the NMP ALRA Table 3.1.1.A, Item 3.1.1.A-22 discussion column by deleting the reference to managing loss of material and crediting the aging effect/mechanism of crack initiation and growth due to SCC. The change is consistent with the GALL Report recommendation. The project team finds this acceptable.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.1A.1.2 Loss of Material Due to Wear; Loss of Preload Due to Stress Relaxation; Crack Initiation and Growth Due to Cyclic Loading and/or SCC

In the discussion section of NMP ALRA Table 3.1.1.A, Item 3.1.1.A-26, the applicant states that loss of material due to wear; loss of preload due to stress relaxation; crack initiation and growth due to cyclic loading and/or SCC of the reactor coolant pressure boundary (RCPB) valve closure bolting, manway and holding bolting, and closure bolting in high-pressure and high-temperature systems will be managed using NMP AMP B2.1.36, "Bolting Integrity

Program." During the audit and review, the project team asked the applicant why Note E is used in NMP ALRA Table 3.1.2.A-3 and Table 3.1.2.A-5 when closure bolting is said to be managed with the applicant's Bolting Integrity Program.

In a letter dated December 1, 2005, the applicant states that it will change the notes mentioned in NMP ALRA Table 3.1.2.A-3 and Table 3.1.2.A-5 from Note E to Note B. The project team finds this to be consistent with GALL Report and therefore acceptable.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.1A.1.3 <u>Crack Initiation and Growth Due to SCC, IGSCC, and/or Cyclic Loading</u>

In the discussion section of NMP ALRA Table 3.1.1.A, Item 3.1.1.A-30, the applicant states that crack initiation and growth due to SCC, IGSCC, and/or cyclic loading of penetrations will be managed using NMP AMP B2.1.2, "Water Chemistry Control Program" and NMP AMP B2.1.8, "BWR Vessel Internals Program." The applicant also states that aging of the CRD stub tube penetrations is managed in accordance with BWRVIP-47, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines," of the applicant's BWR Vessel Internals Program and plant-specific commitments contained in the NRC safety evaluation dated March 25, 1987.

In a letter dated January 13, 2005, the NRC issued RAI 3.1.2-1 to ask the applicant to address the difference between the alternative repair roll/expansion techniques and ASME Code acceptable weld repair for those NMP Unit 1 CRD stub tube penetrations leakage. In a letter dated February 14, 2005, the applicant provided its response to RAI 3.1.2-1, stating that, "NMP committed to implement a strategy whereby during the period of extended operation a leaking control rod drive (CRD) stub tube penetration would be roll repaired. If following the roll repair, this stub tube was to leak within acceptable limits, then a weld repair would be effected no later than one operating cycle following discovery of the leakage." The applicant states, in the NMP ALRA, that it will follow the status of the proposed ASME Code change with respect to allowing roll/expansion techniques of CRD stub tubes, and will implement the final code change or provide an alternative plan for the NMP Unit 1 period of extended operation. This will be accomplished at least one year prior to the expiration of the current operating license.

During the audit and review, the project team noted that the wording in NMP ALRA Table 3.1.1.A, Item 3.1.1.A-1 and in the applicant's response to RAI 3.1.2-1 imply that NMP Unit 1 will operate with CRD stub tube leakage for one operating cycle (two years). The project team does not consider this is acceptable for the period of extended operation. The safety evaluation, dated March 25, 1987, which allows NMP Unit 1 to operate with CRD stub tube leakage, was only acceptable as a temporary repair. Specifically, Item (6) of the NRC's conclusions of the aforementioned safety evaluation, states that, "The proposed leakage criteria provides sufficient time to complete the final development of the prototype mechanical seal and associated tooling and investigate other methods such as weld repair." In a letter dated November 2, 2005, the project team asked the applicant, in RAI 3.1.2-1, to provide justification for CRD stub tube leaking issue.

In a letter dated November 30, 2005, the applicant provides its response to RAI 3.1.2-1 to address this item. The applicant removed the statement regarding plant-specific commitments contained in the NRC safety evaluation dated March 25, 1987 and replaced with the following statements:

> "If the 10/19/05 draft of Code Case N–730 is approved by the ASME, NMP1 will implement the final code case as conditioned by the NRC. If the code case is not approved by the ASME, NMP1 will seek NRC approval of the 10/19/05 code case draft on a plant specific basis as conditioned by the NRC.
>
> During the period of extended operation, should a CRD stub tube rolled in accordance with the provisions of the code case resume leaking, NMP will implement one of the following zero leakage permanent repair strategies prior to startup from the outage in which the leakage was detected:
>
> 1. A welded repair consistent with BWRVIP-58-A, "BWRVIP Internal Access Weld Repair" and Code Case N-606-1, as endorsed by the NRC in Regulatory Guide 1.147.
>
> 2. A variation of the welded repair geometry specified in BWRVIP-58-A subject to the approval of the NRC using Code Case N-606-1.
>
> 3. A future developed mechanical/welded repair method subject to the approval of the NRC."

The project team finds this to be consistent with the GALL Report and therefore acceptable.

In NMP ALRA Table 3.1.2.A-1 (Page 3.1-44), the applicant states that crack initiation and growth due to SCC, IGSCC, and/or cyclic loading of penetrations will be managed using NMP AMP B2.1.2, "Water Chemistry Control Program," NMP AMP B2.1.7, "BWR Penetrations Program," and NMP AMP B2.1.8, "BWR Vessel Internals Program." During the audit and review, the project team asked the applicant to clarify which components are managed using its BWR Vessel Internals Program. The applicant responded that the component type penetrations discussed on Page 3.1-44 includes the CRD stub tube and flux monitor penetrations which are covered by BWRVIP-47. The project team noted that GALL AMP XI.M8, "BWR Penetration Program," covers BWRVIP-27, which addresses the standby liquid control system nozzle or housing, and BWRVIP-49, which provides guidance for instrument penetrations. Based on the applicant's response to the project team question, the CRD stub tube and flux monitor penetrations are managed by BWRVIP-47, which is part of NMP AMP B2.1.8, "BWR Vessel Internals Program. The applicant also responded that its Water Chemistry Control Program is applicable to all vessel penetrations; therefore, the line in the NMP ALRA crediting the applicant's BWR Vessel Internals Program should also include the applicant's Water Chemistry Control Program.

In a letter dated December 1, 2005, the applicant provides its NMP ALRA supplement with the following changes: (1) revise the discussion column for NMP ALRA Table 3.1.1.A, Item

3.1.1.A-30 to add the flux monitor penetrations which are managed by the applicant's BWR Vessel Internals Program; (2) for penetrations in NMP ALRA Table 3.1.2.A-1 (Page 3.1-44), the line item entry for the BWR Vessel Internals Program should also include the Water Chemistry Control Program. The project team finds this to be consistent with the GALL Report and therefore acceptable.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.1A.1.4 Crack Initiation and Growth Due to SCC, IGSCC and/or IASCC

In the discussion section of NMP ALRA Table 3.1.1.A, Item 3.1.1.A-31, the applicant states that crack initiation and growth due to SCC, IGSCC and/or IASCC of the core shroud and core plate, support structure, top guide, core spray lines and spargers, control rod drive housing, and nuclear instrumentation guide tubes will be managed using NMP AMP B2.1.2, “Water Chemistry Control Program” and NMP AMP B2.1.8, “BWR Vessel Internals Program.” During the audit and review, the project team noted that in NMP ALRA Table 3.1.2.A-2 (Page 3.1-51), for example, the applicant's use of Note D, which is credited for the control rod guide tube (CRGT), is not appropriate when comparing control rod guide tubes with the GALL Report, and asked the applicant to provide clarification why Note D is used.

The applicant responded that Note D should be replaced with Note B. Note B is used because of the exception the applicant takes regarding its Water Chemistry Control Program. The latest version of the water chemistry guidelines will be implemented in lieu of the guideline provided in BWRVIP-29 (TR-103515), “BWR Water Chemistry Guidelines - Normal and Hydrogen Water Chemistry.” The project team finds this acceptable because it is consistent with the definition of Note B as identified in NEI 95-10.

In NMP ALRA Table 3.1.2.A-2 (Page 3.1-52), the applicant states that core shroud head bolts and collars are to be managed with its BWR Vessel Internals Program with Note D. The project team reviewed this and found no specific BWR Vessel Internals Program report for this component type. The project team asked the applicant to provide additional information as to how its BWR Vessel Internals Program will manage this item along with inspection details on what NMP does for core shroud head bolts based on operating experience. The applicant explained that its BWR Vessel Internals Program is used to manage aging of core shroud head bolts and collars. The applicant's BWR Vessel Internals Program includes inspection of non-safety-related components that could impact plant operations. These inspections rely heavily on industry operating experience and vendor information such as GE Nuclear Energy Service Information Letters (SIL). Based on the industry operating experience (SIL 433 and SIL 433 Supplement 1) the NMP BWR Vessel Internals Program includes a UT inspection program for the shroud head bolts and collars that are susceptible to IGSCC. Additionally, plant-specific operating experience (SIL 554) has already identified evidence of fretting wear of the locking pins and improperly locked shroud head bolts. For these reasons, the applicant implemented its BWR Vessel Internals Program to manage aging of core shroud head bolts and collars. The project team reviewed the applicant's program basis document, NER-1M-080, “Miscellaneous Non-safety Related Vessel Internal Inspection and Evaluation," and finds that aging of core shroud head bolts and collars are adequately managed using the applicant's BWR Vessel Internals Program.

In NMP ALRA Table 3.1.2.A-2 (Page 3.1-55), the applicant credits its BWR Vessel Internals Program for managing aging of the liquid poison spray line and sparger. During the audit and review, the project team noted that there is no specific BWRVIP report for this component type, and asked the applicant to clarify how BWRVIP manages the item if there is no report for it.

The applicant states that BWRVIP-27, "BWR Vessel and Internals Project, BWR Standby Liquid Control System/Core Plate ªP Inspection and Flaw Evaluation Guidelines," and BWRVIP-47-A, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines," are used as the basis documents to manage aging of spray line and sparger. The basis for aging management in BWRVIP-27 is that the spray line connection to the vessel is required to be inspected while the sparger does not require inspection. Both components, however, fall within BWRVIP-47-A baseline requirements. BWRVIP-47-A states that a baseline inspection is required for all components located below the core plate when access is provided. In addition, the NRC approval letter of BWRVIP-47-A notes that a minimum visual inspection of 5% of the weld or component population within the first six years of the period is required. This population includes the liquid poison line and sparger below the core plates. The project team finds this consistent with the intent of the GALL Report and therefore acceptable.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.1A.1.5 <u>Loss of Fracture Toughness Due to Thermal Aging and Neutron Irradiation Embrittlement</u>

In the discussion section of NMP ALRA Table 3.1.1.A, Item 3.1.1.A-33, the applicant states that this item is not applicable for the jet pump components since NMP Unit 1 does not have jet pumps. Aging management of the orificed fuel supports is conducted in accordance with BWRVIP-47 using GALL AMP XI.M9, "BWR Vessel Internals Program."

The GALL Report credits GALL AMP XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement," to manage the aging effect/mechanism of loss of fracture toughness due to thermal aging and neutron embrittlement. In a letter dated November 17, 2005, the applicant revised its NMP AMP B2.1.8, "BWR Vessel Internals Program" to address the management of fracture toughness due to neutron fluence and thermal embrittlement for NMP Cast Austenitic Stainless (CASS) components. The project team reviewed the applicant's BWR Vessel Internals Program and its evaluation is documented in Section 2.8 of this audit and review report. The project team finds the applicant's BWR Vessel Internals Program acceptable for managing the loss of fracture toughness since the applicant committed to meet the GALL AMP XI.M13 recommendations.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.1A.1.6 Crack Initiation and Growth Due to Cyclic Loading

In the discussion section of NMP ALRA Table 3.1.1.A, Item 3.1.1.A-27, the applicant states that for feedwater nozzles, NMP Unit 1 manages aging with NMP AMP B2.1.5, “BWR Feedwater Nozzle Program,” that is consistent with GALL AMP XI.M5, “Feedwater Nozzle.” The applicant also states that GALL AMP X1.M5 is credited with managing cracking of feedwater nozzle thermal sleeves due to SCC. Verification of the absence of nozzle cracking provides proof that the thermal sleeve intended function is not degraded. In addition, the applicant states that for CRD return line (CRDRL) nozzles, NMP Unit 1 manages aging with NMP AMP B2.1.37, “BWR Control Rod Drive Return Line (CRDRL) Nozzle Program,” which is consistent with GALL AMP XI.M6, “BWR Control Rod Drive Return Line Nozzle.” The applicant also credits GALL AMP X1.M6 with managing cracking of CRD return line nozzle thermal sleeves due to SCC. The applicant states that verification of the absence of nozzle cracking provides proof that the thermal sleeve intended function is not degraded. In a letter dated September 15, 2005, the applicant states that its BWR Feedwater Nozzle and BWR Control Rod Drive Return Line (CRDRL) Nozzle Programs were removed as the credited programs for the feedwater nozzle and CRDRL nozzle thermal sleeves.

During the audit and review, the project team asked the applicant to address the aging management for the thermal sleeves. In a letter dated December 1, 2005, the applicant responded that NMP will use inspections performed under NMP AMP B2.1.8, “BWR Vessel Internals Program,” using surrogate components that are more readily accessible for examination. For NMP Unit 1, the surrogate components will be the feedwater sparger end bracket welds. In this letter, the applicant also provided its basis for choosing the feedwater sparger end bracket welds as follows:

The NMP Unit 1 feedwater nozzle thermal sleeves are fabricated from nickel-based Alloy 600 (Inconel 600). A full penetration weld joins the thermal sleeve to the outboard end of the carbon steel feedwater sparger. This weld was made with Alloy 82 and Alloy 182 weld fillers. The thermal-sleeve to sparger weld, or the heat affected zone in the Alloy 600 base material, is considered the most likely location for IGSCC in the thermal sleeve.

The applicant added that each feedwater sparger is supported by end brackets which provide a spring force that helps hold the thermal sleeve in place. The feedwater sparger end bracket welds consist of three welds: the sparger arm to sparger end plate welds (Weld #1), sparger end plate to bracket end plate weld (Weld #2), and the sparger bracket end plate to end bracket assembly welds (Weld #3), which are dissimilar metal welds that use Alloy 182 or 82 weld fillers.

In addition, the applicant stated that SCC of the feedwater thermal sleeves or the associated welds is possible but is considered less likely than for other welds with the same weld filler associated with the feedwater sparger since the inconel-to-carbon steel welds are heat-treated shop welds and are not creviced. Service experience has demonstrated that Alloy 82 is resistant to intergranular stress corrosion cracking (IGSCC) in BWR reactor coolant. Alloy 182 is less resistant to IGSCC than Alloy 82 but has performed acceptably when aggravating factors, such as lack of fusion or a creviced condition, exist. These conditions are more likely in field welds. The Alloy 600-to-carbon steel welds in the thermal sleeve are full penetration welds and do not create a creviced condition. Additionally, the thermal sleeve assembly was heat treated after welding. The #1 end bracket welds use Alloy 182 filler metal in a mildly creviced condition, making them more susceptible to IGSCC than the thermal sleeve-to-sparger welds. Additionally, the #1 welds are exposed to reactor coolant chemistry on the outer diameter which has a higher electrochemical potential (ECP) and, thus, are more likely to cause IGSCC than feedwater, which has a much lower ECP. Therefore, the applicant stated, if cracking is not found in the #1 welds, inspection of the thermal sleeve-to-sparger welds is not necessary.

Furthermore, the applicant stated that the most susceptible of the three feedwater sparger end bracket welds (Weld #2) are subject to enhanced VT-1 visual inspection (EVT-1) under BWRVIP. If cracking is found in these welds, the other end bracket welds (#1 and #3) will be inspected. If cracking is found in the less susceptible end bracket welds, the necessity to inspect the thermal sleeve-to-sparger welds will be evaluated. The applicant's BWR Vessel Internals Program will, therefore, be credited with managing cracking of the thermal sleeve since the susceptibility of the critical thermal sleeve weld to IGSCC is bounded by other welds inspected under the applicant's BWR Vessel Internals Program. In a letter dated December 1, 2005, the applicant revised the NMP ALRA to add an EVT-1 examination of the NMP Unit 1 feedwater sparger brackets as an enhancement to the BWR Vessel Internals Program to address this issue. The project team reviewed the applicant's response and find it acceptable because the applicant has demonstrated that inspection of surrogate components does bound the feedwater thermal sleeve.

In a letter dated December 1, 2005, the applicant also provided operating experience to address the CRDRL nozzle thermal sleeves as follows:

The inspections of the CRDRL nozzle and safe-ends in 1978 identified IGSCC cracking of the safe-end material, but did not identify fatigue-related cracking. The CRDRL safe-end and the thermal sleeve were replaced in 1978 with design changes to improve resistance to both IGSCC and fatigue. The replacement thermal sleeve material is IGSCC resistant low carbon Type 316L stainless steel material. The thermal sleeve is welded to the safe-end with low carbon Type 308L weld filler. To reduce the probability of fatigue, the thermal sleeve pipe protrudes 7 inches out from the flow shield which promotes mixing away from the vessel wall thus preventing thermal cycling at the vessel wall and at the flow shield.

The applicant also stated that as a result of industry operating experience from 2002 and 2003, NMP completed detailed thermal fatigue assessments and augmented inspections of the safe-end, the thermal sleeve attachment weld to the safe-end, and the thermal sleeve weld to the flow shield. These inspections were performed in 2004 and 2005. The inspections to date have identified no IGSCC or thermal fatigue related cracking. Because the 2003 operating experience identified cracking of the thermal shield flow baffle on the thermal shield, additional enhanced visual inspections (EVT-1) of the thermal shield to flow shield weld from the vessel ID are planned for 2007 at a 10 year frequency thereafter consistent with the ISI inspection interval. This EVT-1 examination of the CRDRL thermal sleeve flow shield weld visible from the vessel ID during each ISI interval is consistent with the frequency that has been adopted for the feedwater nozzle surrogate weld location on the feedwater end brackets.

In addition, the applicant stated that a one-time UT of the CRDRL safe-end base metal was performed in 2004 under the NMP augmented ISI program, 26 years of operation after the 1978 replacement (three outages prior to the license renewal term). This inspection identified no IGSCC or thermal fatigue cracking of the safe-end location. The inspection was a manual Performance Demonstration Initiative (PDI) qualified inspection and the PDI mockup included the thermal sleeve attachment weld to the safe-end. The exam records note the presence of the thermal sleeve attachment weld. This exam is considered sufficient to identify if significant circumferential IGSCC cracking of the thermal sleeve exists at the thermal sleeve attachment weld; however, consistent with the surrogate weld inspection methodology being employed for the feedwater nozzle thermal sleeve, the EVT-1 inspection of the thermal sleeve flow shield weld will also be used as a surrogate weld inspection location for the thermal sleeve to safe-end attachment weld.

In addition to the inspections, the applicant added, temperature monitoring for thermal cycling was performed to confirm that the CRD return flow rates were sufficient at NMP Unit 1 to ensure that no unstable thermal cycling due to hot reactor water return flow is occurring at NMP Unit 1. The testing and analyses established the minimum CRD return flow required to ensure stable return line conditions and confirmed that no reverse flow exists.

The overall conclusion, according to the applicant, is that the safe-end and thermal sleeve replacement with IGSCC-resistant materials and the one time UT of the thermal sleeve attachment weld after 26 years establishes that the thermal sleeve attachment weld is not a high risk IGSCC location. In addition, the thermal monitoring of this location and the inspection after 26 years of operation has also established that no high cycle thermal fatigue conditions exist at this location that could create high thermal cycle fatigue-related cracking concerns.

Furthermore, the applicant continued, that the existing analyses and one time inspections performed in 2004-2005 are adequate to detect potential cracking of the CRDRL Nozzle thermal sleeve to safe-end attachment weld from either IGSCC or fatigue. Even though IGSCC is considered a low probability for this location due to the materials of construction, the BWRVIP program will include an enhancement starting in 2007. An EVT-1 inspection of the thermal shield to flow shield weld from the vessel ID will be performed at that time and at a 10 year frequency thereafter consistent with the ISI inspection interval.

The applicant also stated that, in addition to identifying the condition of the flow shield weld, this EVT-1 inspection of the thermal sleeve flow shield weld will also be used as a surrogate weld inspection location for the thermal sleeve to the safe-end attachment weld. In a letter dated December 1, 2005, the applicant provides its NMP ALRA revision as follows:

1. Revise NMP ALRA Sections A1.1.12, A1.4, and B2.1.8 to incorporate the commitment to perform the EVT-1 inspection of the thermal shield to flow shield weld starting in 2007 and proceeding at a 10 year frequency consistent with the ISI inspection interval thereafter.

2. Revise NMP ALRA Table 3.1.1.A-1, Item 3.1.1.A-27 and NMP ALRA Table 3.1.2.A-1 to reflect the changes.

The project team reviewed the applicant's response and finds it acceptable since the applicant's surrogate weld inspection, in addition to the results of its one-time inspections performed in 2004 to 2005, provide adequate aging management for the CRDRL thermal sleeve.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism for NMP Unit 1 CRDRL nozzle thermal sleeves to meet the intention of the GALL Report.

Conclusion

The project team has evaluated the applicant's claim of consistency with the GALL Report. The project team also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects/mechanisms. On the basis of its review, the project team finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the project team finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL Report

For some line items assigned to the project team in NMP ALRA Tables 3.1.2.A-1 through 3.1.2.A-5, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in NMP ALRA Section 3.1.2.C against the criteria provided in SRP-LR Section 3.1.2.2. The project team's assessments of these evaluations are documented in this section. These assessments are applicable to each Table 2 line item in NMP ALRA Section 3.1.2 that includes a reference to the item in Table 1 for which further evaluation is recommended.

3.1A.2.1 Cumulative Fatigue Damage (NMP ALRA Section 3.1.2.C.1)

NMP ALRA Section 3.1.2.C.1 is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The TLAA is reviewed by the NRR DE staff. The evaluation of this TLAA will be addressed separately in Section 4 of the SER related to the NMP ALRA.

During the audit and review, the project team noted that on Page 3.1-51 of the NMP ALRA, fatigue damage of CRD assemblies (including drive mechanism and housing) is to be managed through the TLAA, but on Page B2-25 of the NMP ALRA, the applicant states that there were no TLAAs. The project team asked the applicant to explain how the specified components are managed for NMP Unit 1. The applicant responded that the only RVI components for NMP Unit 1 that have calculations or analyses meeting the criteria for a TLAA are the core shroud tie rod assemblies, the clamps and the CRD assemblies (including drive mechanism and housing). The tie rod assemblies and clamps are repairs for horizontal and vertical core shroud welds which had ASME III-type stress and fatigue analyses performed during the design process.

The pressure boundary portion of the CRD assemblies was evaluated for fatigue. A cumulative usage factor was determined for the CRD penetration, which included the stub tube, CRD housing, and the stub tube-to-vessel weld and housing-to-stub tube weld. The AMR for the stub tube is addressed in NMP ALRA Table 3.1.2.A. The applicant also responded that for RVI components where there is no analysis meeting the TLAA criteria, the Aging Management Program column of NMP ALRA Table 3.1.2.A-2 will be modified to replace TLAA, evaluated in accordance with 10 CFR 54.21(c), with “None.” A plant-specific note referencing the relevant BWRVIP Inspection and Evaluation guideline or other basis for not managing fatigue will be added to NMP ALRA Table 3.1.2.A-2 for each component with “None” in the AMP column for the aging effect/mechanism of cumulative fatigue damage, or where the TLAA is applicable only to a subset of the component type.

In a letter dated December 1, 2005, the applicant provides its response by revising NMP ALRA Table 3.1.2.A-2 and Table 3.1.2.B-2 to address this issue. The project team determined that high cumulative fatigue usage factor indicates a high potential for crack initiation. Although the applicant’s response removed the aging effect of cumulative fatigue damage for those components identified in the December 1, 2005 letter, the aging effect of cracking is adequately managed through other AMPs. Therefore, the project team finds it acceptable.

Based on a review of the applicant’s response, the project team finds the applicant’s action consistent with the GALL Report and therefore acceptable.

3.1A.2.2 Loss of Material Due to Pitting and Crevice Corrosion (NMP ALRA Section 3.1.2.C.2)

3.1A.2.2.1 Loss of Material Due to Pitting and Crevice Corrosion (NMP ALRA Section 3.1.2.C.2)

The project team reviewed NMP ALRA Section 3.1.2.C.2 against the criteria in SRP-LR Section 3.1.2.2.2.

The applicant states, in the NMP ALRA, that for pitting and crevice corrosion in the PWR steam generator shell assembly, this aging effect/mechanism is not applicable to NMP. The project team determined through discussions with the applicant’s technical staff that the pitting and crevice corrosion in the PWR steam generator shell assembly aging effect/mechanism is not applicable at NMP.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.1A.2.2.2 Loss of Material Due to Pitting and Crevice Corrosion (NMP ALRA Section 3.1.2.C.2)

The project team reviewed NMP ALRA Section 3.1.2.C.2 against the criteria in SRP-LR Section 3.1.2.2.2.

SRP-LR Section 3.1.2.2.2.2 states that loss of material due to pitting and crevice corrosion could occur in BWR isolation condenser components. The existing program relies on control of reactor water chemistry to mitigate corrosion and on ASME Section XI inservice inspection (ISI). However, the existing program should be augmented to detect loss of material due to pitting or crevice corrosion. The GALL Report recommends an augmented program to include temperature and radioactivity monitoring of the shell-side water, and eddy current testing of tubes to ensure that the component's intended function will be maintained during the period of extended operation.

In NMP ALRA Section 3.1.2.C.2, the applicant addresses loss of material of isolation condenser components due to general, pitting and crevice corrosion. The NMP ALRA states that NMP Unit 1 has emergency (isolation) condensers (ECs). The design of the emergency condensers features end bells that are welded to the EC shell, which are not designed to be removed. Therefore, eddy current testing of the tubing is not possible. Loss of material is managed by a combination of several programs. NMP AMP B2.1.2, "Water Chemistry Control Program," controls chemical contaminants in both the tube and shell side water such that the conditions that would promote pitting and crevice corrosion are prevented. The EC tube side, which is ASME Class 2, is subject to a system inservice pressure test under NMP AMP B2.1.1, "ASME Section XI (Subsections IWB, IWC, and IWD) Inservice Inspection Program." The pressure test would detect a tube leak caused by pitting or crevice corrosion. The EC shell is ASME Class 3 and is subject to a functional test under the applicant's Inservice Pressure Testing Program which is part of its ASME Section XI Inservice Inspection (Subsections IWB, IWC, and IWD) Program. The functional test would detect loss of material due to pitting and crevice corrosion if the corrosion caused a through wall leak of the EC shell.

In the NMP ALRA, the applicant also states, that for additional verification that a tube leak does not exist, NMP Unit 1 will implement an online tube leakage test. The test will be performed by isolating the makeup and drain valves to the emergency condenser tube side, and monitoring the shell side level for 24 to 48 hours to ensure the water level is not increasing. A water level increase on the shell side during the test would indicate tube leakage. The online test will be incorporated as a new activity in NMP AMP B2.1.32, "Preventive Maintenance Program." The new activity will be implemented prior to the period of extended operation.

The applicant's Preventive Maintenance Program is reviewed by NRR DE staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA. The project team reviewed the applicant's Water Chemistry Control and ASME Section XI (Subsections IWB, IWC, and IWD) Inservice Inspection Programs and its evaluations are documented in Sections 2.2 and 2.1 of this audit and review report, respectively.

The applicant further states, in NMP ALRA Section 3.1.2.C.2, that its Preventive Maintenance Program is also credited for managing loss of material due to pitting and crevice corrosion because it includes the temperature monitoring performed on the emergency cooling system, including the heat exchangers. Continuous radiation monitoring of the EC shell side vents is also performed, which would provide indication of a tube leak.

In addition, in NMP ALRA Section 3.1.2.C.2, the applicant states, that since none of the activities described above would detect loss of material due to pitting and crevice corrosion before a leak occurred, these activities will be supplemented by a visual inspection for cracking and loss of material of the accessible outer surfaces of the peripheral tubes, tube sheet, and emergency condenser shell. This activity will also be incorporated into the applicant's Preventive Maintenance Program.

During the audit and review, the project team noted that inaccessibility alone cannot justify exemption from inspection, where required for aging management, and operating experience (documented in IEB 76-01, "BWR Isolation Condenser Tube Failure") indicates that tube cracking is an issue. During the audit and review, the project team asked the applicant to provide additional justification to address this issue. The applicant responded that NMP confirms that the existing and committed aging management activities provide adequate assurance that any tube degradation in the isolation condensers will not lead to a loss of intended function without the need for eddy current testing. These activities include water chemistry control, temperature monitoring of the shell side and tube side water, continuous radioactivity monitoring of the condenser vent line, periodic performance testing and a future on-line tube leakage test. NMP Unit 1 has experienced tube leakage previously and replaced the whole tube bundle with upgraded material in 1997. A keep fill modification was also installed to eliminate the stressor which caused the tube failures. Therefore, the applicant continued, since the original isolation condenser tubes lasted 28 years with an aging stressor, the new tubes are expected to perform their intended function through the period of extended operation with improved material and upgraded system design and monitoring.

During the audit and review, the project team asked the applicant to provide its basis for not performing eddy current testing. In a letter dated December 1, 2005, the applicant provides its basis as follows:

1) Condition and stresses that are precursors to SCC of tubes have been eliminated by:
    a) Lowering temperature of the tubes primary and shell side water
    b) Maintaining shell side water chemistry
    c) Maintaining BWR primary water chemistry
2) The susceptibility of the tubes to SCC has been improved by design changes to:
    a) Replace the tube bundle material with Type 316 stainless steel (low carbon)
    b) Install a keep fill system to maintain steam water interface above top of tube bundle (no thermal cycles)

3) Monitoring and detection of conditions in the steam inlet (tube side) and shell side of the Isolation condensers ensures conditions will not re-occur.
    a) Water temperature
    b) Water chemistry (conductively, chloride, nitrates, sulfates)

4) A commitment has been made to perform a tube leak test at operating pressure to detect small leaks.

The project team reviewed the applicant's nuclear commitment tracking list to confirm that the online tube leakage test will be implemented as a new activity in the Preventive Maintenance Program as indicated in Commitment 29 of NMP ALRA Section A1.4. The project team reviewed the applicant's response and finds that NMP Unit 1 isolation condenser tubes are adequately managed and will be able to perform the intended function at least 32 years to the end of the period of extended operation.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.1.2.2.2 for further evaluation. Predicated on DE acceptance of the applicant's Preventive Maintenance Program, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.3 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement (NMP ALRA Section 3.1.2.C.3)

3.1A.2.3.1 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement (NMP ALRA Section 3.1.2.C.3)

NMP ALRA Section 3.1.2.C.3 is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The TLAA is reviewed by the NRR DE staff. The evaluation of this TLAA will be addressed separately in Section 4 of the SER related to the NMP ALRA.

3.1A.2.3.2 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement (NMP ALRA Section 3.1.2.C.3)

The project team reviewed NMP ALRA Table 3.1.1.A, Item 3.1.1.A-05 against the criteria in SRP-LR Section 3.1.2.2.3.2.

SRP-LR Section 3.1.2.2.3.2 states that loss of fracture toughness due to neutron irradiation embrittlement could occur in the reactor vessel. NMP AMP B2.1.19, "Reactor Vessel Surveillance Program," monitors neutron irradiation embrittlement of the reactor vessel.

In the NMP ALRA Table 3.1.2.A-1 (Page 3.1-49), the applicant states that loss of fracture toughness of vessel shells (beltline, lower shell, upper nozzle shell and upper RPV shell and vessel shell welds (include attachment welds) is to be managed using its Reactor Vessel Surveillance Program. The project team reviewed this, and during the audit and review, asked the applicant to clarify which areas have neutron fluence exceeding 1E17 n/cm^2 (E>1MeV).

The applicant responded that vessel shells - beltline, and vessel shells - lower and the beltline welds have a neutron fluence exceeding 1E17 n/cm^2. Aging of these components is managed by the applicant's Reactor Vessel Surveillance Program. The component type, attachment welds, does not need to be managed by the applicant's Reactor Vessel Surveillance Program, because, even though these welds receive a neutron fluence greater than or equal to

1E17 n/cm^2, they are not ferritic material. The applicant will modify NMP ALRA Table 3.1.2.A-1 to reflect those components that are managed through its Reactor Vessel Surveillance Program. The project team finds this consistent with the GALL Report and therefore acceptable. In a letter dated December 1, 2005, the applicant provides its revision of the NMP ALRA Table 3.1.2.A-1 (Page 3.1-49) to address this issue. The applicant's Reactor Vessel Surveillance Program is reviewed by NRR DE staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.1.2.2.3.2 for further evaluation. Predicated on DE acceptance of the applicant's Reactor Vessel Surveillance Program, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.4 Crack Initiation and Growth Due to Thermal and Mechanical Loading or Stress Corrosion Cracking (NMP ALRA Section 3.1.2.C.4)

3.1A.2.4.1 Crack Initiation and Growth Due to Thermal and Mechanical Loading or Stress Corrosion Cracking (NMP ALRA Section 3.1.2.C.4)

The project team reviewed NMP ALRA Section 3.1.2.C.4 against the criteria in SRP-LR Section 3.1.2.2.4.1.

SRP-LR Section 3.1.2.2.4.1 states that crack initiation and growth due to thermal and mechanical loading or SCC (including intergranular stress corrosion cracking [IGSCC]) could occur in small-bore reactor coolant system and connected system piping less than NPS 4. The existing program relies on ASME Section XI ISI and on control of water chemistry to mitigate SCC. The GALL Report recommends that a plant-specific destructive examination or a nondestructive examination (NDE) that permits inspection of the inside surfaces of the piping be conducted to ensure that cracking has not occurred and the component intended function will be maintained during the extended period. The AMPs should be augmented by verifying that service-induced weld cracking is not occurring in the small-bore piping less than NPS 4, including pipes, fittings, and branch connections. A one-time inspection of a sample of locations is an acceptable method to ensure that the aging effect/mechanism is not occurring and the component's intended function will be maintained during the period of extended operation.

In NMP ALRA Section 3.1.2.C.4, the applicant addresses crack initiation and growth due to thermal and mechanical loading or SCC (including intergranular stress corrosion cracking) that could occur in small-bore reactor coolant system and connected system piping less than NPS 4.

In the NMP ALRA, the applicant also states, that for NMP Unit 1, aging of the subject small-bore piping is managed by NMP AMP B2.1.1, "ASME Section XI (Subsections IWB, IWC, and IWD) Inservice Inspection Program," NMP AMP B2.1.2, "Water Chemistry Control Program," and NMP AMP B2.1.20, "One-Time Inspection Program."

Additionally, the applicant states in the NMP ALRA, that for small-bore piping and fittings in the NMP Unit 1 CRD system that is not part of its ASME Section XI (Subsections IWB, IWC, and IWD) Inservice Inspection Program, NMP only credits its Water Chemistry Control and One-Time Inspection Programs to manage aging.

The applicant further states, in the NMP ALRA, that for the small-bore piping, whether included in its ASME Section XI (Subsection IWB, IWC, and IWD) Inservice Inspection Program or not, the inspections conducted under its One-Time Inspection Program will consist of NDE using methods with a demonstrated capability to detect cracks on the inside surfaces of the piping, or destructive examinations. Both nondestructive and destructive examinations will be performed on a sample of the piping population.

In NMP ALRA Table 3.1.2.A-5, the applicant states that aging of CASS valves is to be managed using its ASME Section XI (Subsection IWB, IWC, and IWD) Inservice Inspection, One-Time Inspection, and Water Chemistry Control Programs. The intended functions of the CASS valve are leakage boundary (spatial) (LBS) and structural integrity attached (SIA). During the audit and review, the project team noted that LBS and SIA apply only to non-safety-related (NSR) components. The applicant was informed and concluded that this is an editorial mistake. The applicant will revise NMP ALRA Table 3.1.2.A-5, so that its ASME Section XI (Subsection IWB, IWC, and IWD) Inservice Inspection, One-Time Inspection, and Water Chemistry Control Programs are assigned to manage aging of the pressure boundary valves, and its One-Time Inspection and Water Chemistry Control Programs are assigned to manage aging of the LBS, SIA valves. In a letter dated December 1, 2005, the applicant provides its revision to NMP ALRA Table 3.1.2.A-5 to address this issue. The project team finds this consistent with the GALL Report and therefore acceptable.

The project team reviewed the applicant's ASME Section XI (Subsection IWB, IWC, and IWD) Inservice Inspection, One-Time Inspection and Water Chemistry Control Programs and its evaluations are documented in Sections 2.1, 2.19 and 2.2 of this audit and review report, respectively.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.1.2.2.4.1 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.4.2 Crack Initiation and Growth Due to Thermal and Mechanical Loading or Stress Corrosion Cracking (NMP ALRA Section 3.1.2.C.4)

The project team reviewed NMP ALRA Section 3.1.2.C.4 against the criteria in SRP-LR Section 3.1.2.2.4.2.

SRP-LR Section 3.1.2.2.4.2 states that crack initiation and growth due to thermal and mechanical loading or SCC (including IGSCC) could occur in BWR reactor vessel flange leak detection line and BWR jet pump sensing line. The GALL Report recommends that a plant-specific aging management program be evaluated to mitigate or detect crack initiation and growth due to SCC of vessel flange leak detection line. Acceptance criteria are described in Branch Technical Position RLSB-1.

In NMP ALRA Section 3.1.2.C.4, the applicant addresses crack initiation and growth due to thermal and mechanical loading or SCC (including IGSCC) that could occur in BWR reactor vessel flange leak detection line and BWR jet pump sensing line.

The applicant states, in the NMP ALRA, that for NMP Unit 1, cracking of the vessel flange leak detection lines is managed by NMP AMP B2.1.1, "ASME Section XI (Subsection IWB, IWC, and IWD) Inservice Inspection Program," NMP AMP B2.1.20, "One-Time Inspection Program," and NMP AMP B2.1.2, "Water Chemistry Control Program." The inspections conducted under the applicant's One-Time Inspection Program will consist of NDE using methods with a demonstrated capability to detect cracks on the inside surfaces of the piping, or destructive examinations. Both nondestructive and destructive examinations will be performed on a sample of the piping population. A portion of the NMP Unit 2 vessel flange leak detection line is carbon steel and is not subject to cracking. The applicant states that loss of material of the carbon steel portion is managed by its Water Chemistry Control Program and One-Time Inspection Program.

The applicant also states, in the NMP ALRA, that NMP Unit 1 does not have a jet pump sensing line. Therefore, the aging effect/mechanism of cracking is not applicable for jet pump sensing lines at NMP.

In NMP ALRA Table 3.1.2.A.1, the applicant states that aging of wrought austenitic stainless steel (WASS) valves is to be managed by its ASME Section XI (Subsection IWB, IWC, and IWD) Inservice Inspection, One-Time Inspection, and Water Chemistry Control Programs. The intended functions of the component are LBS and SIA, which are associated with NSR components. During the audit and review the project team asked the applicant to explain why NSR components are managed by ASME ISI and why NMP ALRA Table 3.1.1.A, Item 3.1.1.A-08 was determined to belong to this component type when it is NSR. The applicant states that small-bore valves associated with the vessel flange leak detection lines are NSR for NMP Unit 1. These lines/valves are, however, SR for NMP Unit 2 with an ISI pressure test performed on these lines when there is a RFO. Hence, WASS valves are managed by the applicant's ASME Section XI (Subsection IWB, IWC, and IWD) Inservice Inspection Program. The project team finds this is acceptable on the basis that it is consistent with the GALL Report.

The project team reviewed the applicant's ASME Section XI (Subsection IWB, IWC, and IWD) Inservice Inspection, One-Time Inspection and Water Chemistry Programs and its evaluations are documented in Sections 2.1, 2.19 and 2.2 of this audit and review report, respectively.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.1.2.2.4.2 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.4.3 Crack Initiation and Growth Due to Thermal and Mechanical Loading or Stress Corrosion Cracking (NMP ALRA Section 3.1.2.C.4)

The project team reviewed NMP ALRA Section 3.1.2.C.4 against the criteria in SRP-LR Section 3.1.2.2.4.3.

SRP-LR Section 3.1.2.2.4.3 states that crack initiation and growth due to thermal and mechanical loading or SCC (including IGSCC) could occur in BWR isolation condenser components. The existing program relies on control of reactor water chemistry to mitigate SCC and on ASME Section XI inservice inspection (ISI). However, the existing program should be augmented to detect cracking due to SCC or cyclic loading. The GALL Report recommends an augmented program to include temperature and radioactivity monitoring of the shell-side water, and eddy current testing of tubes to ensure that the component's intended function will be maintained during the period of extended operation.

In NMP ALRA Section 3.1.2.C.4, the applicant addresses crack initiation and growth due to thermal and mechanical loading or SCC (including IGSCC) that could occur in BWR isolation condenser components.

The applicant states, in the NMP ALRA, that NMP Unit 1 has emergency (isolation) condensers (ECs). The design of the emergency condensers features end bells that are welded to the EC shell, which are not designed to be removed. Therefore, eddy current testing of the tubing is not possible. Cracking is managed by a combination of several programs. NMP AMP B2.1.2, "Water Chemistry Control Program," controls chemical contaminants in both the tube and shell side water such that the conditions that would promote cracking are prevented. The EC tube side, which is ASME Class 2, is subject to a system inservice pressure test under NMP AMP B2.1.1, "ASME Section XI (Subsection IWB, IWC, and IWD) Inservice Inspection Program." The pressure test would detect a tube leak caused by cracking. The EC shell is ASME Class 3 and is subject to a functional test under the applicant's Inservice Pressure Testing Program which is part of its ASME Section XI (Subsection IWB, IWC, and IWD) Inservice Inspection Program. The functional test would detect cracking due to SCC or cyclic loading if the crack caused a through wall leak of the EC shell.

In the NMP ALRA, the applicant also states, that for additional verification that a tube leak does not exist, NMP Unit 1 will implement an online tube leakage test. The test will be performed by isolating the makeup and drain valves to the emergency condenser tube side, and monitoring the shell side level for 24 to 48 hours to ensure the water level is not increasing. A water level increase on the shell side during the test would indicate tube leakage. The online test will be incorporated as a new activity in NMP AMP B2.1.32, "Preventive Maintenance Program." The new activity will be implemented prior to the period of extended operation.

In addition, the applicant states, in the NMP ALRA, that its Preventive Maintenance Program is also credited for detecting cracking because it includes the temperature monitoring performed on the emergency cooling system, including the heat exchangers. Temperature monitoring can provide early indication of a tube leak. Continuous radiation monitoring of the EC shell side vents is also performed, which would provide indication of a tube leak.

In the NMP ALRA, the applicant also states, that since none of the activities described above would detect crack initiation or stress corrosion cracking before a leak occurred, these activities will be supplemented by a visual inspection for cracking from the accessible outer surfaces of the peripheral tubes, tube sheet, and emergency condenser shell. This activity will also be incorporated into the applicant's Preventive Maintenance Program.

The applicant's Preventive Maintenance Program is reviewed by NRR DE staff and will be addressed separately in Section 3 of the SER related the NMP ALRA. The project team reviewed the applicant's Water Chemistry Control and ASME Section XI (Subsection IWB, IWC, and IWD) Inservice Inspection Programs and its evaluations are documented in Sections 2.2 and 2.1 of this audit and review report, respectively.

During the audit and review, the project team noted that inaccessibility alone cannot justify exemption from inspection, where required for aging management, and operating experience (documented in IEB 76-01, "BWR Isolation Condenser Tube Failure") indicates that tube cracking is an issue. During the audit and review, the project team asked the applicant to provide additional justification to address this issue. The applicant responded that NMP confirms that the existing and committed aging management activities provide adequate assurance that any tube degradation in the isolation condensers will not lead to a loss of intended function without the need for eddy current testing. These activities include water chemistry control, temperature monitoring of the shell side and tube side water, continuous radioactivity monitoring of the condenser vent line, periodic performance testing and a future on-line tube leakage test. NMP Unit 1 has experienced tube leakage previously and replaced the whole tube bundle with upgraded material in 1997. A keep fill modification was also installed to eliminate the stressor which caused the tube failures. Therefore, the applicant continued with its response, since the original isolation condenser tubes lasted 28 years with an aging stressor, the new tubes are expected to perform their intended function through the period of extended operation with improved material and upgraded system design and monitoring.

During the audit and review, the project team asked the applicant to provide its basis for not performing eddy current testing. In a letter dated December 1, 2005, the applicant provides its basis as follows:

1) Condition and stresses that are precursors to SCC of tubes have been eliminated by:
   a) Lowering temperature of the tubes primary and shell side water
   b) Maintaining shell side water chemistry
   c) Maintaining BWR primary water chemistry

2) The susceptibility of the tubes to SCC has been improved by design changes to:
    a) Replace the tube bundle material with Type 316 stainless steel (low carbon)
    b) Install a keep fill system to maintain steam water interface above top of tube bundle (no thermal cycles)

3) Monitoring and detection of conditions in the steam inlet (tube side) and shell side of the Isolation condensers ensures conditions will not re-occur.
    a) Water temperature
    b) Water chemistry (conductively, chloride, nitrates, sulfates)

4) A commitment has been made to perform a tube leak test at operating pressure to detect small leaks.

The project team reviewed the applicant's nuclear commitment tracking list to confirm that the online tube leakage test will be implemented as a new activity in the Preventive Maintenance Program as indicated in Commitment 29 of NMP ALRA Section A1.4. The project team reviewed the applicant's response and finds that NMP Unit 1 isolation condenser tubes are adequately managed and will be able to perform the intended function at least 32 years to the end of the period of extended operation.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.1.2.2.4.3 for further evaluation. Pending DE acceptance of the applicant's Preventive Maintenance Program, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1A.2.15 <u>Quality Assurance for Aging Management of Non-Safety-Related Components (NMP ALRA Section 3.1.2.C.15)</u>

NMP ALRA Section 3.1.2.C.15 is reviewed by the NRR DIPM staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA.

<u>Conclusion</u>

On the basis of its review, for component groups evaluated in the GALL Report for which the GALL Report recommends further evaluation, the project team determined that the applicant adequately addressed these issues. For these items, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B NMP ALRA Unit 2 Section 3.1 - Aging Management of Reactor Vessel, Internals, and Reactor Coolant Systems

In NMP ALRA Section 3.1, the applicant provided the results of its AMRs for the reactor vessel, internals, and reactor coolant systems.

In NMP ALRA Tables 3.1.2.B-1 through 3.1.2.B-5, the applicant provided a summary of the AMR results for component types associated with the (1) reactor pressure vessel; (2) reactor pressure vessel internals; (3) reactor pressure vessel instrumentation system; (4) reactor recirculation system; and (5) control rod drive system. The summary information for each component type included intended function; material; environment; aging effect/mechanism requiring management; AMPs; the GALL Report Volume 2 item; cross reference to NMP ALRA Table 3.1.1.B (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

For each component type in NMP ALRA Table 3.1.1.B, the applicant identified those component types that are managed in a manner consistent with the GALL Report, component types for which the GALL Report recommends further evaluation, and those AMRs that are not addressed in the GALL Report together with the method proposed for their aging management.

The project team conducted its audit and review in accordance with SRP-LR Section 3.1.3 and the NMP audit and review plan. The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report.

3.1B.1 Aging Management Review Results That Are Consistent with the GALL Report

For aging management evaluations that the applicant states are consistent with the GALL Report, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the NMP ALRA is acceptable.

The project team reviewed its assigned NMP ALRA line items to determine that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects/mechanisms have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects/mechanisms for the reactor pressure vessel, reactor pressure vessel internals, reactor pressure vessel instrumentation system, reactor recirculation system, and the control rod drive system components that are subject to an AMR.

The following subparagraphs identify differences, when compared to the GALL Report, that were identified by the project team during the audit and review.

3.1B.1.1 Crack Initiation and Growth Due to SCC and/or IGSCC

In the discussion section of NMP ALRA Table 3.1.1.B, Item 3.1.1.B-22, the applicant states that NMP AMP B2.1.3, "Reactor Head Closure Studs Program," is credited for closure head studs and nuts that have an aging effect/mechanism of loss of material due to general corrosion. During the audit and review, the project team noted that NMP ALRA Table 3.1.1.B, Item 3.1.1.B-22 is applicable for the aging effect/mechanism of cracking and asked the applicant to provide clarification.

In a letter dated December 1, 2005, the applicant states that NMP ALRA Table 3.1.1.B, Item 3.1.1.B-22 discussion column will be revised by deleting the reference to managing loss of material and crediting the aging effect/mechanism of crack initiation and growth due to SCC. The project team finds this consistent with the GALL Report and therefore acceptable.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.1B.1.2 Crack Initiation and Growth Due to Cyclic Loading

In the discussion section of NMP ALRA Table 3.1.1.B, Item 3.1.1.B-27, the applicant states that for feedwater nozzles, NMP Unit 2 manages aging with NMP AMP B2.1.5, “BWR Feedwater Nozzle Program,” which is consistent with GALL AMP XI.M5, “Feedwater Nozzle.”

The applicant also states, in the NMP ALRA that, GALL AMP XI.M5 is also credited with managing cracking of feedwater nozzle thermal sleeves due to SCC. Verification of the absence of nozzle cracking provides proof that the thermal sleeve intended function is not degraded. For CRD return line (CRDRL) nozzles, NMP Unit 2 manages aging with NMP AMP B2.1.37, “BWR Control Rod Drive Return Line (CRDRL) Nozzle Program,” which is consistent with GALL AMP XI.M6, “BWR Control Rod Drive Return Line Nozzle.” GALL AMP XI.M6 is also credited with managing cracking of CRD return line nozzle thermal sleeves due to SCC. The applicant states that verification of the absence of nozzle cracking provides proof that the thermal sleeve intended function is not degraded. In a letter dated September 15, 2005, the applicant states that its BWR Feedwater Nozzle and BWR Control Rod Drive Return Line (CRDRL) Nozzle Programs were removed as the credited programs for the feedwater nozzle and CRDRL nozzle thermal sleeves. During the audit and review, the project team asked the applicant to address the aging management for the feedwater nozzle thermal sleeves. The applicant responded that NMP will use inspections performed under NMP AMP B2.1.8, “BWR Vessel Internals Program,” using surrogate components that are more readily accessible for examination. For NMP Unit 2, the surrogate components will be the feedwater sparger end bracket welds. During the audit and review, the applicant also provided its basis for choosing the feedwater sparger end bracket welds as follows:

The applicant noted that a similar evaluation of the NMP Unit 2 feedwater sparger welds and the selection of surrogate welds that are accessible for inspection would also be acceptable for NMP Unit 2. These accessible welds would be used as a leading indicator for potential IGSCC cracking of the thermal sleeve. If cracking is found in these welds, a supplemental evaluation of the thermal sleeve integrity would be required.

The applicant stated that the review of the NMP Unit 2 feedwater thermal sleeve and sparger has been completed. The review has confirmed that the thermal sleeve material is 316L, with several hidden stainless steel welds. The fabrication method review is not complete. The fabrication review will determine the welding procedures, and if the welds were stress relieved. If the hidden welds were stress relieved, the welds would not be considered susceptible to IGSCC and the aging effect of cracking would not be considered applicable to NMP Unit 2.

In addition, the applicant stated during the audit and review, that the review of the NMP Unit 2 feedwater sparger installation details identified the field installation applied a 20,000 lbf load creating a 0.125" cold spring to the sparger. The sparger end brackets were pinned, locking in the cold spring, and then final field welded with a fillet weld. The applicant further stated that this installation detail is similar to the NMP Unit 1 installation detail. The result of the cold spring is a fit-up net tensile stress superimposed on the weld residual stress. The combination of the fit-up stress (cold spring) plus the residual stress of the field weld conditions and the fillet weld crevice geometry create a higher susceptibility to IGSCC as compared to the thermal sleeve welds. The reactor water chemistry in the region of the feedwater sparger end bracket welds is equivalent to, if not more aggressive than, the corrosion potential of the reactor water in contact with the outside diameter weld of the thermal sleeve. The applicant also stated that an EVT-1 examination of the NMP Unit 1 and NMP Unit 2 feedwater sparger end bracket welds will be added to its BWR Vessel Internals Program as a program enhancement. The inspection extent and frequency of the end bracket weld inspection will be the same as the ASME Section XI inspection of the feedwater sparger bracket vessel attachment welds. If the final fabrication review of the NMP Unit 2 feedwater thermal sleeve concludes that the hidden welds are not IGSCC susceptible, the NMP Unit 2 inspections will be discontinued.

Furthermore, the applicant stated that the overall conclusion is that the NMP Unit 2 feedwater sparger end bracket welds represent a conservative inspection of the material condition of the hidden thermal sleeve welds with regard to potential IGSCC cracking. Therefore, consistent with the discussion between the project team and the applicant during the audit and review, cracking of the NMP Unit 2 feedwater nozzle thermal sleeves will be managed by the applicant's BWR Feedwater Nozzle, BWR Vessel Internals, and Water Chemistry Control Programs. In a letter dated December 1, 2005, the applicant states that it will to add an EVT-1 examination of the NMP Unit 2 feedwater sparger brackets as an enhancement to its BWR Vessel Internals Program to address this issue. The project team reviewed the applicant's response and finds it acceptable since the applicant's surrogate weld inspection provides adequate aging management for the feedwater nozzle thermal sleeves.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.1B.1.3 Loss of Fracture Toughness Due to Thermal Aging and Neutron Irradiation Embrittlement

In the discussion section of NMP ALRA Table 3.1.1.B, Item 3.1.1.B-33, the applicant states that loss of fracture toughness due to thermal aging and neutron irradiation embrittlement of jet pumps is managed by BWRVIP-41, "BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines," of GALL AMP XI.M9, "BWR Vessel Internals Program." Aging management of the orificed fuel supports is conducted in accordance with BWRVIP-47, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines," of GALL AMP XI.M9.

GALL AMP XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel," is credited for managing the aging effect/mechanism of loss of fracture toughness due to thermal aging and neutron embrittlement. In a letter dated November 17, 2005, the applicant revised its NMP AMP B2.1.8, "BWR Vessel Internals Program" to address the management of fracture toughness due to neutron fluence and thermal embrittlement for NMP Cast Austenitic Stainless Steel (CASS) components. The project team reviewed the applicant's BWR Vessel Internals Program and its evaluation is documented in Section 2.8 of this audit and review report. The project team finds the applicant's BWR Vessel Internals Program acceptable for managing the loss of fracture toughness since the applicant committed to meet the GALL AMP XI.M13 recommendations.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

Conclusion

The project team has evaluated the applicant's claim of consistency with the GALL Report. The project team also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects/mechanisms. On the basis of its review, the project team finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the project team finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL Report

For some line items assigned to the project team in NMP ALRA Tables 3.1.2.B-1 through 3.1.2.B-5, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in NMP ALRA Section 3.1.2.C against the criteria provided in SRP-LR Section 3.1.2.2. The project team's assessments of these evaluations are documented in this section. These assessments are applicable to each Table 2 line item in NMP ALRA Section 3.1.2 that includes a reference to the item in Table 1 for which further evaluation is recommended.

3.1B.2.1 Cumulative Fatigue Damage (NMP ALRA Section 3.1.2.C.1)

NMP ALRA Section 3.1.2.C.1 is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The TLAA is reviewed by the NRR DE staff. The evaluation of this TLAA will be addressed separately in Section 4 of the SER related to the NMP ALRA.

During the audit and review, the project team noted that a TLAA should not be credited as an AMP unless the subject component meets the 10 CFR 54.21(c) criteria for a TLAA. The applicant provided its response as documented in Section 3.1A.2.1 of this audit and review report. In a letter dated December 1, 2005, the applicant provides its revision to NMP ALRA Table 3.1.2.B-2 to address this issue. The project team determined that high cumulative fatigue usage factor indicates a high potential for crack initiation. Although the applicant's response removed the aging effect of cumulative fatigue damage for those components identified in the December 1, 2005 letter, the aging effect of cracking is adequately managed through other AMPs. Therefore, the project team finds it acceptable.

Based on a review of the applicant's response, the project team finds the applicant's action consistent with the GALL Report and therefore acceptable.

3.1B.2.2 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement (NMP ALRA Section 3.1.2.C.3)

3.1B.2.2.1 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement (NMP ALRA Section 3.1.2.C.3)

NMP ALRA Section 3.1.2.C.3 is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The TLAA is reviewed by the NRR DE staff. The evaluation of this TLAA will be addressed separately in Section 4 of the SER related to the NMP ALRA.

3.1B.2.2.2 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement (NMP ALRA Section 3.1.2.C.3)

The project team reviewed NMP ALRA Table 3.1.1.B, Item 3.1.1.B-05 against the criteria in SRP-LR Section 3.1.2.2.3.2.

SRP-LR Section 3.1.2.2.3.2 states that loss of fracture toughness due to neutron irradiation embrittlement could occur in the reactor vessel. NMP AMP B2.1.19, "Reactor Vessel Surveillance Program," monitors neutron irradiation embrittlement of the reactor vessel. The applicant's Reactor Vessel Surveillance Program is reviewed by NRR DE staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA.

In the NMP ALRA Table 3.1.2.B-1 (Pages 3.1-78 and 79), the applicant states that loss of fracture toughness of vessel shells (beltine, lower shell, upper nozzle shell and upper RPV shell and vessel shell welds (include attachment welds) is to be managed using its Reactor Vessel Surveillance Program. The project team reviewed this, and asked the applicant to clarify which areas have neutron fluence exceeding 1E17 n/cm^2 (E>1MeV).

The applicant responded that vessel shells - beltline, and vessel shells - lower and the beltline welds have a neutron fluence exceeding 1E17 n/cm^2. Aging of these components is managed by the applicant's Reactor Vessel Surveillance Program. The component type, attachment welds, does not need to be managed by the applicant's Reactor Vessel Surveillance Program because, even though these welds receive a neutron fluence greater than or equal to E17 n/cm^2, they are not ferritic material. The only carbon/low alloy steel attachments welds are the steam dryer holddown bracket attachment welds in the upper head, which are low-fluence welds. The applicant will modify NMP ALRA Table 3.1.2.B-1 to reflect those components that are managed through Reactor Vessel Surveillance Program. In a letter dated December 1, 2005, the applicant provides its revision of NMP ALRA Table 3.1.2.B-1 to address this issue. The project team finds this consistent with the GALL Report and therefore acceptable.

In NMP ALRA Table 3.1.2.B-1 (Page 3.1-72), the applicant states that loss of fracture toughness of nozzles is to be managed using its Reactor Vessel Surveillance Program. The project team reviewed this, and asked the applicant to provide clarification on which nozzles are to be managed under the Reactor Vessel Surveillance Program.

The applicant responded that LPCI/RHR nozzles and water level nozzle are to be managed by the Reactor Vessel Surveillance Program. The activities under the Reactor Vessel Surveillance Program include an analysis of these nozzles to determine whether the nozzles will become limiting with respect to P-T limits. The analysis for these nozzles will consider the projected fluence for 54 EFPY for the nozzles. The applicant will add a plant-specific Note 76 to NMP ALRA Table 3.1.2.B-1 to further clarify those components that are managed through the Reactor Vessel Surveillance Program. In a letter dated December 1, 2005, the applicant provides its clarification by adding plant-specific Note 76 to NMP ALRA Table 3.1.2.B-1 to address this issue. The project team finds this consistent with the GALL Report and therefore acceptable.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.1.2.2.3.2 for further evaluation. Predicated on DE acceptance of the applicant's Reactor Vessel Surveillance Program, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.2.3 Crack Initiation and Growth Due to Thermal and Mechanical Loading or Stress Corrosion Cracking (NMP ALRA Section 3.1.2.C.4)

3.1B.2.3.1 Crack Initiation and Growth Due to Thermal and Mechanical Loading or Stress Corrosion Cracking (NMP ALRA Section 3.1.2.C.4)

The project team reviewed NMP ALRA Section 3.1.2.C.4 against the criteria in SRP-LR Section 3.1.2.2.4.1.

SRP-LR Section 3.1.2.2.4.1 states that crack initiation and growth due to thermal and mechanical loading or SCC (including intergranular stress corrosion cracking [IGSCC]) could occur in small-bore reactor coolant system and connected system piping less than NPS 4. The existing program relies on ASME Section XI ISI and on control of water chemistry to mitigate SCC. The GALL Report recommends that a plant-specific destructive examination or a nondestructive examination (NDE) that permits inspection of the inside surfaces of the piping be conducted to ensure that cracking has not occurred and the component intended function will be maintained during the extended period. The AMPs should be augmented by verifying that service-induced weld cracking is not occurring in the small-bore piping less than NPS 4, including pipe, fittings, and branch connections. A one-time inspection of a sample of locations is an acceptable method to ensure that the aging effect/mechanism is not occurring and the component's intended function will be maintained during the period of extended operation.

In NMP ALRA Section 3.1.2.C.4, the applicant addresses crack initiation and growth due to thermal and mechanical loading or SCC (including intergranular stress corrosion cracking) that could occur in small-bore reactor coolant system and connected system piping less than NPS 4.

In the NMP ALRA, the applicant also states, that for NMP Unit 2, aging of the subject small-bore piping is managed by NMP AMP B2.1.1, "ASME Section XI (Subsection IWB, IWC, and IWD) Inservice Inspection Program," NMP AMP B2.1.2, " Water Chemistry Control Program," and NMP AMP B2.1.20, "One-Time Inspection Program."

Additionally, the applicant states in the NMP ALRA, that for NMP Unit 2 reactor vessel instrumentation, reactor recirculation, and CRD systems that are not part of its ASME Section XI (Subsection IWB, IWC, and IWD) Inservice Inspection Program, NMP only credits its Water Chemistry Control and One-Time Inspection Programs to manage aging.

The applicant further states, in the NMP ALRA, that for the small-bore piping, whether included in the ASME Section XI, Subsection IWB, IWC, and IWD Inservice Inspection Program or not, the inspections conducted under the One-Time Inspection Program will consist of NDE using methods with a demonstrated capability to detect cracks on the inside surfaces of the piping, or destructive examinations. Both nondestructive and destructive examinations will be performed on a sample of the piping population.

The project team reviewed the applicant's Inservice Inspection Plan and One-Time Inspection Program and finds that NMP has adequately managed this issue and the action is consistent with the GALL Report recommendation. The project team evaluations of the applicant's ASME Section XI (Subsection IWB, IWC, and IWD) Inservice Inspection, Water Chemistry Control and One-Time Inspection Programs are documented in Sections 2.1, 2.2 and 2.19 of this audit and review report, respectively.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.1.2.2.4.1 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.2.3.2 Crack Initiation and Growth Due to Thermal and Mechanical Loading or Stress Corrosion Cracking (NMP ALRA Section 3.1.2.C.4)

The project team reviewed NMP ALRA Section 3.1.2.C.4 against the criteria in SRP-LR Section 3.1.2.2.4.2.

SRP-LR Section 3.1.2.2.4.2 states that crack initiation and growth due to thermal and mechanical loading or SCC (including IGSCC) could occur in BWR reactor vessel flange leak detection line and BWR jet pump sensing line. The GALL Report recommends that a plant-specific aging management program be evaluated to mitigate or detect crack initiation and growth due to SCC of vessel flange leak detection line. Acceptance criteria are described in Branch Technical Position RLSB-1.

In NMP ALRA Section 3.1.2.C.4, the applicant addresses crack initiation and growth due to thermal and mechanical loading or SCC (including IGSCC) that could occur in BWR reactor vessel flange leak detection line and BWR jet pump sensing line.

The applicant states, in the NMP ALRA, that for NMP Units 1 and 2, cracking of the vessel flange leak detection lines is managed by NMP AMP B2.1.1, “ASME Section XI, Subsections IWB, IWC, and IWD Inservice Inspection Program,” NMP AMP B2.1.20, “One-Time Inspection Program,” and NMP AMP B2.1.2, “Water Chemistry Control Program.” The inspections conducted under the applicant’s One-Time Inspection Program will consist of NDE using methods with a demonstrated capability to detect cracks on the inside surfaces of the piping, or destructive examinations. Both nondestructive and destructive examinations will be performed on a sample of the piping population. A portion of the NMP Unit 2 vessel flange leak detection line is carbon steel and is not subject to cracking. The applicant states that loss of material of the carbon steel portion is managed by its Water Chemistry Control and One-Time Inspection Programs.

The applicant also states, in the NMP ALRA, that for NMP Unit 2, the jet pump sensing lines are not within the scope of license renewal. Therefore, the aging effect/mechanism of cracking is not applicable for jet pump sensing lines at NMP.

The project team reviewed the applicant’s piping and instrument drawings (P&ID) and Inservice Inspection Plan to determine that the applicant’s action is adequate and consistent with the GALL Report recommendation.

The project team reviewed the applicant’s ASME Section XI (Subsection IWB, IWC, and IWD) Inservice Inspection, Water Chemistry Control and One-Time Inspection Programs and its evaluations are documented in Sections 2.1, 2.2 and 2.19 of this audit and review report, respectively.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.1.2.2.4.2 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.1B.2.3.3 Crack Initiation and Growth Due to Thermal and Mechanical Loading or Stress Corrosion Cracking (NMP ALRA Section 3.1.2.C.4)

The project team reviewed NMP ALRA Section 3.1.2.C.4 against the criteria in SRP-LR Section 3.1.2.2.4.3.

The applicant states, in the NMP ALRA, that for the isolation condenser, this aging effect/mechanism is not applicable to NMP Unit 2. The project team determined through discussions with the applicant's technical staff that the crack initiation and growth of the isolation condenser due to thermal and mechanical loading or stress corrosion cracking is not applicable to NMP Unit 2.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP Unit 2.

3.1B.2.4 Quality Assurance for Aging Management of Non-Safety-Related Components (NMP ALRA Section 3.1.2.C.15)

NMP ALRA Section 3.1.2.C.15 is reviewed by the NRR DIPM staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA.

Conclusion

On the basis of its review, for component groups evaluated in the GALL Report for which the GALL Report recommends further evaluation, the project team determined that the applicant adequately addressed these issues. For these items, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A NMP ALRA Unit 1 Section 3.2 - Aging Management of Engineered Safety Features

In NMP ALRA Section 3.2, the applicant provided the results of its AMRs for the engineered safety features systems.

In NMP ALRA Tables 3.2.2.A-1 through 3.2.2.A-3, the applicant provided a summary of the AMR results for component types associated with the (1) containment spray system; (2) core spray system; and (3) emergency cooling system. The summary information for each component type included intended function; material; environment; aging effect/mechanism requiring management; AMPs; the GALL Report Volume 2 item; cross reference to NMP ALRA Table 3.2.1.A (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

For each component type in NMP ALRA Table 3.2.1.A, the applicant identified those component types that are managed in a manner consistent with the GALL Report, component types for which the GALL Report recommends further evaluation, and those AMRs that are not addressed in the GALL Report together with the method proposed for their aging management.

The project team conducted its audit and review in accordance with SRP-LR Section 3.2.3 and the NMP audit and review plan. The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report.

3.2A.1 Aging Management Review Results That Are Consistent with the GALL Report

For aging management evaluations that the applicant states are consistent with the GALL Report, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the NMP ALRA is acceptable.

The project team reviewed its assigned NMP ALRA line items to determine that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects/mechanisms have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects/mechanisms for the containment spray system, core spray system, and the emergency cooling system components that are subject to an AMR.

The following subparagraphs identify differences, when compared to the GALL Report, that were identified by the project team during the audit and review.

3.2A.1.1 Loss of Material Due to Microbiologically Influenced Corrosion (MIC)

In the discussion section of NMP ALRA Table 3.2.1.A, Item 3.2.1.A-06, the applicant states that loss of material due to microbiologically influenced corrosion (MIC) does not exist for containment isolation valves in the NMP Unit 1 ESF systems, and that it does require management for components of the radioactive waste system.

During the audit and review, the project team noted that no component types had been identified for aging management consistent with NMP ALRA Table 3.2.1.A, Item 3.2.1.A-06, in Table 3.3.2.A-14, "NMP1 Radioactive Waste System."

In a letter dated August 19, 2005, the applicant states that MIC is an aging effect/mechanism for systems with raw water as an environment, and that for ESF systems this issue is not applicable to NMP Unit 1.

During the audit and review, the project team determined that containment isolation valves (CIVs) in the ESF systems are exposed to air, reactor grade water, and steam, and that MIC is not an effect requiring aging management for these components. In interviews with the applicant's technical staff, the project team confirmed that water of the radioactive waste system is not raw water as the term is used in the SRP-LR. The project team agrees and concludes that this issue is not applicable to NMP Unit 1.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.2A.1.2 <u>Crack Initiation and Growth Due to SCC and IGSCC</u>

In the discussion section of NMP ALRA Table 3.2.1.A, Item 3.2.1.A-16, the applicant states that for small-bore valves and piping, NMP AMP B2.1.20, "One-Time Inspection Program," is used to manage this aging effect/mechanism. The GALL Report suggests using NMP AMP B2.1.6, "BWR Stress Corrosion Cracking Program," and NMP AMP B2.1.2, "Water Chemistry Control Program," for managing SCC and IGSCC in pumps, valves, piping and fittings in emergency core cooling systems.

During the audit and review, the project team noted that for NMP ALRA Table 3.2.2.A-3 (Page 3.2-55) line item component type piping and fittings, material type wrought austenitic stainless steel, aging effect cracking, and NMP AMP B2.1.20, "One-Time Inspection Program," it is not clear whether these components are also age managed with the applicant's Water Chemistry Control and BWR Stress Corrosion Cracking Programs. It is also not clear to which components the applicant's One-Time Inspection Program applies within this component type grouping. During the audit and review, the applicant was asked to clarify this line item.

In a letter dated December 1, 2005, the applicant states that for the components in the subject line item, the BWR Stress Corrosion Cracking Program was not credited because this line item is for small bore piping. Piping and fittings in the emergency condenser system which are age managed by the applicant's One-Time Inspection Program are not included in its BWR Stress Corrosion Cracking Program either because they are small bore piping (<4 inches nominal diameter), they are in a low temperature environment, or they are not made from austenitic stainless steel material. However, the applicant's Water Chemistry Control Program, in addition to its One-Time Inspection Program, should have been credited for this line item. The subject line item is revised to credit the applicant's Water Chemistry Control Program in addition to its One-Time Inspection Program in managing cracking for this component group. Note 10 is also added to the "Notes" column.

The project team reviewed the applicant's response and finds that after revision of the applicant's AMR line item as described above, the use of its Water Chemistry Control Program to manage cracking is consistent with the GALL Report. Since the line item component is small bore piping and fittings, the applicant's BWR Stress Corrosion Cracking Program is not applicable and its One-Time Inspection Program is an adequate alternative.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

<u>Conclusion</u>

The project team has evaluated the applicant's claim of consistency with the GALL Report. The project team also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects/mechanisms. On the basis of its review, the project team finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the project team finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL Report

For some line items assigned to the project team in NMP ALRA Tables 3.2.2.A-1 through 3.2.2.A-3, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in NMP ALRA Section 3.2.2.C against the criteria provided in SRP-LR Section 3.2.2.2. The project team's assessments of these evaluations is documented in this section. These assessments are applicable to each Table 2 line item in NMP ALRA Section 3.2.2 that includes a reference to the item in Table 1 for which further evaluation is recommended.

3.2A.2.1 Cumulative Fatigue Damage (NMP ALRA Section 3.2.2.C.1)

NMP ALRA Section 3.2.2.C.1 is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The TLAA is reviewed by the NRR DE staff. The evaluation of this TLAA will be addressed separately in Section 4 of the SER related to the NMP ALRA.

3.2A.2.2 Loss of Material Due to General Corrosion (NMP ALRA Section 3.2.2.C.2)

3.2A.2.2.1 Loss of Material Due to General Corrosion (NMP ALRA Section 3.2.2.C.2)

The project team reviewed NMP ALRA Section 3.2.2.C.2 against the criteria in SRP-LR Section 3.2.2.2.2.1.

SRP-LR Section 3.2.2.2.2.1 states that the management of loss of material due to general corrosion of pumps, valves, piping, and fittings associated with some of the BWR emergency core cooling systems and with lines to the suppression chamber and to the drywell and suppression chamber spray system should be further evaluated. The existing aging management program relies on monitoring and control of primary water chemistry based on EPRI guidelines to mitigate degradation. However, control of primary water chemistry does not preclude loss of material due to general corrosion at locations of stagnant flow conditions. Therefore, verification of the effectiveness of the applicant's Chemistry Control Program should be performed to ensure that corrosion is not occurring.

The GALL Report recommends further evaluation of programs to manage loss of material due to general corrosion to verify the effectiveness of the applicant's Chemistry Control Program. A one-time inspection of select components at susceptible locations is an acceptable method to determine whether an aging effect/mechanism is not occurring or an aging effect/mechanism is progressing very slowly such that the component's intended function will be maintained during the period of extended operation.

In NMP ALRA Section 3.2.2.C.2, the applicant addresses loss of material at locations with stagnant flow conditions, due to general corrosion of pumps, valves, piping, and fittings associated with some of the BWR emergency core cooling systems and with lines to the suppression chamber and to the drywell and suppression chamber spray system.

In the NMP ALRA, the applicant also states, that for NMP Unit 1, the applicable systems are the containment spray, core spray, emergency cooling, and main steam (for automatic depressurization) systems. The aging effect/mechanism is managed by the combination of NMP AMP B2.1.2, "Water Chemistry Control Program" and NMP AMP B2.1.20, "One-Time Inspection Program."

The project team reviewed the applicant's Water Chemistry Control and One-Time Inspection Programs and its evaluations are documented in Sections 2.2 and 2.19 of this audit and review report, respectively.

The project team reviewed the applicant's further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.2.2.2.2.1 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.2.2.2 Loss of Material Due to General Corrosion (NMP ALRA Section 3.2.2.C.2)

The project team reviewed NMP ALRA Section 3.2.2.C.2 against the criteria in SRP-LR Section 3.2.2.2.2.2.

SRP-LR Section 3.2.2.2.2.2 states that loss of material due to general corrosion could occur in the drywell and suppression chamber spray systems header and spray nozzle components, standby gas treatment system components, containment isolation valves and associated piping, the automatic depressurization system piping and fittings, emergency core cooling system header piping and fittings and spray nozzles, and the external surfaces of carbon steel components. The GALL Report recommends further evaluation on a plant-specific basis to ensure that the aging effect/mechanism is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

In NMP ALRA Section 3.2.2.C.2, the applicant addresses loss of material due to general corrosion of components in the standby gas treatment, containment isolation, and emergency core cooling systems.

In the NMP ALRA, the applicant also states, that for NMP Unit 1, the applicable systems are the containment spray, core spray, emergency cooling, reactor building ventilation (for standby gas treatment) and main steam (for automatic pressurization) systems. The aging effect/mechanism for internal surfaces is managed by NMP AMP B2.1.20, "One-Time Inspection Program," NMP AMP B2.1.32, "Preventive Maintenance Program" or NMP AMP B2.1.10, "Open-Cycle Cooling Water Program." The aging effect/mechanism for external surfaces of carbon steel components in the ECCS systems is managed by NMP AMP B2.1.33, "Systems Walkdown Program."

The applicant's Preventive Maintenance and Systems Walkdown Programs are reviewed by the NRR DE staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA. The project team reviewed the applicant's One-Time Inspection and Open-Cycle Cooling Water Programs and its evaluations are documented in Sections 2.19 and 2.10 of this audit and review report, respectively.

The project team reviewed the applicant's further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.2.2.2.2.2 for further evaluation. Predicated on NRR DE staff acceptance of the applicant's Preventive Maintenance and Systems Walkdown Programs, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.2.3 Local Loss of Material Due to Pitting and Crevice Corrosion (NMP ALRA Section 3.2.2.C.3)

3.2A.2.3.1 Local Loss of Material Due to Pitting and Crevice Corrosion (NMP ALRA Section 3.2.2.C.3)

The project team reviewed NMP ALRA Section 3.2.2.C.3 against the criteria in SRP-LR Section 3.2.2.2.3.1.

SRP-LR Section 3.2.2.2.3.1 states that the management of local loss of material due to pitting and crevice corrosion of pumps, valves, piping, and fittings associated with some of the BWR emergency core cooling system piping and fittings and with lines to the suppression chamber and to the drywell and suppression chamber spray system should be evaluated further. The existing aging management program relies on monitoring and control of primary water chemistry based on EPRI guidelines to mitigate degradation. However, control of coolant water chemistry does not preclude loss of material due to crevice and pitting corrosion at locations of stagnant flow conditions. Therefore, verification of the effectiveness of the applicant's Chemistry Control Program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage the loss of material due to pitting and crevice corrosion to verify the effectiveness of the applicant's Chemistry Control Program.

In NMP ALRA Section 3.2.2.C.3, the applicant addresses loss of material at locations with stagnant flow conditions, due to pitting and crevice corrosion of pumps, valves, piping, and fittings associated with some of the BWR emergency core cooling systems and with lines to the suppression chamber and to the drywell and suppression chamber spray system.

In the NMP ALRA, the applicant further states, that for NMP Unit 1, the applicable systems are the containment spray, core spray, and emergency cooling systems. The aging effect/mechanism is managed by the combination of NMP AMP B2.1.2, “Water Chemistry Control Program,” and NMP AMP B2.1.20, “One-Time Inspection Program.”

The project team reviewed the applicant’s Water Chemistry Control and One-Time Inspection Programs and its evaluations are documented in Sections 2.2 and 2.19 of this audit and review report, respectively.

The project team reviewed the applicant’s further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.2.2.2.3.1 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.2.3.2 Local Loss of Material Due to Pitting and Crevice Corrosion (NMP ALRA Section 3.2.2.C.3)

The project team reviewed NMP ALRA Section 3.2.2.C.3 against the criteria in SRP-LR Section 3.2.2.2.3.2.

SRP-LR Section 3.2.2.2.3.2 states that local loss of material from pitting and crevice corrosion could occur in the containment isolation valves and associated piping and automatic depressurization system piping and fittings. The GALL Report recommends further evaluation to ensure that the aging effect/mechanism is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

In NMP ALRA Section 3.2.2.C.3, the applicant addresses loss of material due to pitting and crevice corrosion of components in the standby gas treatment, containment isolation, and emergency core cooling systems.

In the NMP ALRA, the applicant also states, that for NMP Unit 1, the applicable systems are the containment spray, core spray, emergency cooling, and main steam (for automatic depressurization) systems. The aging effect/mechanism is managed by NMP AMP B2.1.20, “One-Time Inspection Program,” NMP AMP B2.1.32, “Preventive Maintenance Program,” or NMP AMP B2.1.10, “Open-Cycle Cooling Water Program.”

The applicant's Preventive Maintenance Program is reviewed by the NRR DE staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA. The project team reviewed the applicant's Open-Cycle Cooling Water and One-Time Inspection Programs and its evaluations are documented in Sections 2.10 and 2.19 of this audit and review report, respectively.

The project team reviewed the applicant's further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.2.2.2.3.2 for further evaluation. Predicated on NRR DE staff acceptance of the applicant's Preventive Maintenance Program, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.2.4 Local Loss of Material Due to Microbiologically Influenced Corrosion (NMP ALRA Section 3.2.2.C.4)

The project team reviewed NMP ALRA Section 3.2.2.C.4 against the criteria in SRP-LR Section 3.2.2.2.4.

The applicant states, in the NMP ALRA, that for the local loss of material due to microbiologically influenced corrosion (MIC) in containment isolation valves and associated piping, this aging effect/mechanism is not applicable to NMP. NMP considers MIC to be an aging effect/mechanism for systems with raw water as an environment. NMP Unit 1 does not have a raw water environment for containment isolation valves or the associated piping. Therefore, this issue is not applicable for NMP Unit 1. The project team determined through discussions with the applicant's technical staff that the local loss of material due to MIC in containment isolation valves and associated piping is not applicable to NMP Unit 1.

On the basis that NMP Unit 1 does not have any containment isolation valves subject to this aging effect/mechanism, the project team finds that this aging effect/mechanism is not applicable to NMP Unit 1.

3.2A.2.5 Changes in Properties Due to Elastomer Degradation (NMP ALRA Section 3.2.2.C.5)

The project team reviewed NMP ALRA Section 3.2.2.C.5 against the criteria in SRP-LR Section 3.2.2.2.5.

SRP-LR Section 3.2.2.2.5 states that changes in properties due to elastomer degradation could occur in seals associated with the standby gas treatment system ductwork and filters. The GALL Report recommends further evaluation to ensure that the aging effect/mechanism is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

In NMP ALRA Section 3.2.2.C.5, the applicant addresses change in material properties of seals in the standby gas treatment system.

In the NMP ALRA, the applicant also states, that for NMP Unit 1, the reactor building ventilation system provides the equivalent function as a standby gas treatment system. For the internal surfaces of the system's seals (seals are grouped with blowers), the aging effects/mechanisms are managed by NMP AMP B2.1.32, "Preventive Maintenance Program." For the external surfaces, the aging effects/mechanisms are managed by NMP AMP B2.1.33, "Systems Walkdown Program." The applicant's Preventive Maintenance and Systems Walkdown Programs are reviewed by the NRR DE staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA.

The project team reviewed the applicant's further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.2.2.2.5 for further evaluation. Predicated on NRR DE staff acceptance of the applicant's Preventive Maintenance and Systems Walkdown Programs, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.2.6 Local Loss of Material Due to Erosion (NMP ALRA Section 3.2.2.C.6)

The project team reviewed NMP ALRA Section 3.2.2.C.6 against the criteria in SRP-LR Section 3.2.2.2.6.

The applicant states, in the NMP ALRA, that this issue is applicable only to charging pumps in the chemical and volume control systems of PWRs and is not applicable to NMP Unit 1.

On the basis that NMP is a BWR, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.2A.2.7 Buildup of Deposits Due to Corrosion (NMP ALRA Section 3.2.2.C.7)

The project team reviewed NMP ALRA Section 3.2.2.C.7 against the criteria in SRP-LR Section 3.2.2.2.7.

SRP-LR Section 3.2.2.2.7 states that the plugging of components due to general corrosion could occur in the spray nozzles and flow orifices of the drywell and suppression chamber spray system. This aging effect/mechanism and effect will apply since the spray nozzles and flow orifices are occasionally wetted, even though the majority of the time this system is on standby. The wetting and drying of these components can aid in the acceleration of this particular corrosion. The GALL Report recommends further evaluation to ensure that the aging effect/mechanism is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

In NMP ALRA Section 3.2.2.C.7, the applicant addresses the plugging of components due to general corrosion in the spray nozzles and flow orifices of the drywell and suppression chamber spray system.

In the NMP ALRA, the applicant also states, that for NMP Unit 1, the containment spray system contains the subject spray nozzles and flow orifices. The plugging of spray nozzles due to general corrosion is not an applicable aging effect/mechanism since these components are stainless steel and not susceptible to general corrosion. The plugging of flow orifices due to general corrosion is not an applicable aging effect/mechanism since the lines containing these components are completely drained following each system operation in which they are wetted. The draining ensures no corrosion products accumulate in the flow orifices. The flow orifices are located in the containment spray heat exchanger drain lines such that, should plugging occur, the intended safety function would not be adversely impacted.

The project team finds that general corrosion of stainless steel spray nozzles is not an aging effect/mechanism that requires aging management. On the basis of discussions with the applicant’s technical staff during the audit and review, the project team finds that plugging of orifices does not have an adverse impact upon the intended function of the system.

The project team finds that the applicant has met the criteria of SRP-LR Section 3.2.2.2.7 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2A.2.8 Quality Assurance for Aging Management of Non-Safety-Related Components (NMP ALRA Section 3.2.2.C.8)

NMP ALRA Section 3.2.2.C.8 is reviewed by the NRR DIPM staff and will be addressed separately in Section 3 of the SER related to the NMP LRA.

Conclusion

On the basis of its review, for component groups evaluated in the GALL Report for which the GALL Report recommends further evaluation, the project team determined that the applicant adequately addressed these issues. For these items, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B NMP ALRA Unit 2 Section 3.2 - Aging Management of Engineered Safety Features

In NMP ALRA Section 3.2, the applicant provided the results of its AMRs for the engineered safety features systems.

In NMP ALRA Tables 3.2.2.B-1 through 3.2.2.B-6, the applicant provided a summary of the AMR results for component types associated with the (1) hydrogen recombiner system; (2) high pressure core spray system; (3) low pressure core spray system; (4) reactor core isolation cooling system; (5) residual heat removal system; (6) standby gas treatment system. The summary information for each component type included intended function; material; environment; aging effect/mechanism requiring management; AMPs; the GALL Report Volume 2 item; cross reference to NMP ALRA Table 3.2.1.B (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

For each component type in NMP ALRA Table 3.2.1.B, the applicant identified those component types that are managed in a manner consistent with the GALL Report, component types for which the GALL Report recommends further evaluation, and those AMRs that are not addressed in the GALL Report together with the method proposed for their aging management.

The project team conducted its audit and review in accordance with SRP-LR Section 3.2.3 and the NMP audit and review plan. The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report.

3.2B.1 Aging Management Review Results That Are Consistent with the GALL Report

For aging management evaluations that the applicant states are consistent with the GALL Report, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the NMP ALRA is acceptable.

The project team reviewed its assigned NMP ALRA line items to determine that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects/mechanisms have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects/mechanisms for the hydrogen recombiner system, high pressure core spray system, low pressure core spray system, reactor core isolation cooling system, residual heat removal system, and standby gas treatment system components that are subject to an AMR.

The following subparagraphs identify differences, when compared to the GALL Report, that were identified by the project team during the audit and review.

3.2B.1.1 Cumulative Fatigue Damage

In the discussion section of NMP ALRA Table 3.2.1.B, Item 3.2.1.B-01, the applicant states that piping, fittings, and valves in the emergency core cooling systems may be subject to cumulative fatigue damage and are to be subject to TLAA. In NMP ALRA Table 3.4.2.B-4, the project team noted that this was applied to a flexible hose.

During the audit and review, the applicant's technical staff explained that the hose is a flexible bellows welded to end fittings of rigid pipe. A braided stainless steel sheath protects the outer diameter of the bellows. The component is designed to absorb movement, and no TLAA has been performed.

TLAAs are evaluated in accordance with 10 CFR 54.21(c), and reviewed by the NRR DE staff. The evaluation of TLAAs will be addressed separately in Section 4 of the SER related to the NMP LRA.

3.2B.1.2 Loss of Material Due to Microbiologically Influenced Corrosion (MIC)

In the discussion section of NMP ALRA Table 3.2.1.B, Item 3.2.1.B-06, the applicant states that loss of material due to MIC does not exist for these components in the NMP Unit 2 ESF systems, and that it does require management for components of the NMP Unit 2 floor and equipment drains system.

During the audit and review, the project team determined that containment isolation valves (CIVs) in the ESF systems are exposed to air, reactor grade water, and steam, and that MIC is not an effect requiring aging management for these components. In interviews with the applicant’s technical staff, the project team confirmed that water of the NMP Unit 2 floor and equipment drains system is not raw water as the term is used in the SRP-LR.

In a letter dated August 19, 2005, the applicant states that MIC is an aging effect/mechanism for systems with raw water as an environment, and that for ESF systems this issue is not applicable to NMP Unit 2. The project team agrees that this issue is not applicable to NMP Unit 2.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

Conclusion

The project team has evaluated the applicant's claim of consistency with the GALL Report. The project team also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects/mechanisms. On the basis of its review, the project team finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the project team finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL Report

For some line items assigned to the project team in NMP ALRA Tables 3.2.2.B-1 through 3.2.2.B-6, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in NMP ALRA Section 3.2.2.C against the criteria provided in SRP-LR Section 3.2.2.2. The project team’s assessments of these evaluations is documented in this section. These assessments are applicable to each Table 2 line item in NMP ALRA Section 3.2.2 that includes a reference to the item in Table 1 for which further evaluation is recommended.

3.2B.2.1 Cumulative Fatigue Damage (NMP ALRA Section 3.2.2.C.1)

NMP ALRA Section 3.2.2.C.1 is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The TLAA is reviewed by the NRR DE staff. The evaluation of this TLAA will be addressed separately in Section 4 of the SER related to the NMP LRA.

3.2B.2.2 Loss of Material Due to General Corrosion (NMP ALRA Section 3.2.2.C.2)

3.2B.2.2.1 Loss of Material Due to General Corrosion (NMP ALRA Section 3.2.2.C.2)

The project team reviewed NMP ALRA Section 3.2.2.C.2 against the criteria in SRP-LR Section 3.2.2.2.2.1.

SRP-LR Section 3.2.2.2.2.1 states that the management of loss of material due to general corrosion of pumps, valves, piping, and fittings associated with some of the BWR emergency core cooling systems and with lines to the suppression chamber and to the drywell and suppression chamber spray system. The existing aging management program relies on monitoring and control of primary water chemistry based on EPRI guidelines to mitigate degradation. However, control of primary water chemistry does not preclude loss of material due to general corrosion at locations of stagnant flow conditions. Therefore, verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring.

The GALL Report recommends further evaluation of programs to manage loss of material due to general corrosion to verify the effectiveness of the chemistry control program. A one-time inspection of select components at susceptible locations is an acceptable method to determine whether an aging effect/mechanism is not occurring or an aging effect/mechanism is progressing very slowly such that the component's intended function will be maintained during the period of extended operation.

In NMP ALRA Section 3.2.2.C.2, the applicant addresses loss of material, at locations with stagnant flow conditions, due to general corrosion of pumps, valves, piping, and fittings associated with some of the BWR emergency core cooling systems and with lines to the suppression chamber and to the drywell and suppression chamber spray system.

In the NMP ALRA, the applicant also states, that for NMP Unit 2, the applicable systems are the high pressure core spray, low pressure core spray, reactor core isolation cooling and residual heat removal systems. The aging effect/mechanism is managed by the combination of NMP AMP B2.1.2, "Water Chemistry Control Program," and NMP AMP B2.1.20, "One-Time Inspection Program."

The project team reviewed the applicant's Water Chemistry Control and One-Time Inspection Programs and its evaluations are documented in Sections 2.2 and 2.19 of this audit and review report, respectively.

The project team reviewed the applicant's further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.2.2.2.2.1 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B.2.2.2 Loss of Material Due to General Corrosion (NMP ALRA Section 3.2.2.C.2)

The project team reviewed NMP ALRA Section 3.2.2.C.2 against the criteria in SRP-LR Section 3.2.2.2.2.2.

SRP-LR Section 3.2.2.2.2.2 states that loss of material due to general corrosion could occur in the drywell and suppression chamber spray systems header and spray nozzle components, standby gas treatment system components, containment isolation valves and associated piping, the automatic depressurization system piping and fittings, emergency core cooling system header piping and fittings and spray nozzles, and the external surfaces of carbon steel components. The GALL Report recommends further evaluation on a plant-specific basis to ensure that the aging effect/mechanism is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

In NMP ALRA Section 3.2.2.C.2, the applicant addresses loss of material due to general corrosion of components in the standby gas treatment, containment isolation, and emergency core cooling systems (ECCS).

In the NMP ALRA, the applicant also states, that for NMP Unit 2, the applicable systems are the hydrogen recombiner, reactor core isolation cooling, standby gas treatment, and main steam (for automatic depressurization) systems. The aging effect/mechanism for internal surfaces is managed by the NMP AMP B2.1.20, "One-Time Inspection Program." The aging effect/mechanism for external surfaces of carbon steel components in ECCS systems is managed by NMP AMP B2.1.33, "Systems Walkdown Program."

The applicant's Systems Walkdown Program is reviewed by the NRR DE staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA. The project team reviewed the applicant's One-Time Inspection Program and its evaluation is documented in Section 2.19 of this audit and review report.

The project team reviewed the applicant's further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.2.2.2.2.2 for further evaluation. Predicated on NRR DE staff acceptance of the applicant's Systems Walkdown Program, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B.2.3 Local Loss of Material Due to Pitting and Crevice Corrosion (NMP ALRA Section 3.2.2.C.3)

3.2B.2.3.1 Local Loss of Material Due to Pitting and Crevice Corrosion (NMP ALRA Section 3.2.2.C.3)

The project team reviewed NMP ALRA Section 3.2.2.C.3 against the criteria in SRP-LR Section 3.2.2.2.3.1.

SRP-LR Section 3.2.2.2.3.1 states that the management of local loss of material due to pitting and crevice corrosion of pumps, valves, piping, and fittings associated with some of the BWR emergency core cooling system piping and fittings [high pressure coolant injection, reactor core isolation cooling, high pressure core spray, low pressure core spray, low pressure coolant injection (residual heat removal)] and with lines to the suppression chamber and to the drywell and suppression chamber spray system should be evaluated further. The existing aging management program relies on monitoring and control of primary water chemistry based on EPRI guidelines to mitigate degradation. However, control of coolant water chemistry does not preclude loss of material due to crevice and pitting corrosion at locations of stagnant flow conditions. Therefore, verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage the loss of material due to pitting and crevice corrosion to verify the effectiveness of the chemistry control program.

In NMP ALRA Section 3.2.2.C.3, the applicant addresses loss of material at locations with stagnant flow conditions, due to pitting and crevice corrosion of pumps, valves, piping, and fittings associated with some of the BWR emergency core cooling systems and with lines to the suppression chamber and to the drywell and suppression chamber spray system.

In the NMP ALRA, the applicant further states, that for NMP Unit 2, the applicable systems are the high pressure core spray, low pressure core spray, reactor core isolation cooling and residual heat removal systems. The aging effect/mechanism is managed by the combination of NMP AMP B2.1.2, "Water Chemistry Control Program," and NMP AMP B2.1.20, "One-Time Inspection Program."

The project team reviewed the applicant's Water Chemistry Control and One-Time Inspection Programs and its evaluations are documented in Sections 2.2 and 2.19 of this audit and review report, respectively.

The project team reviewed the applicant's further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.2.2.2.3.1 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B.2.3.2 Local Loss of Material Due to Pitting and Crevice Corrosion (NMP ALRA Section 3.2.2.C.3)

The project team reviewed NMP ALRA Section 3.2.2.C.3 against the criteria in SRP-LR Section 3.2.2.2.3.2.

SRP-LR Section 3.2.2.2.3.2 states that local loss of material from pitting and crevice corrosion could occur in containment isolation valves and associated piping and automatic depressurization system piping and fittings. The GALL Report recommends further evaluation to ensure that the aging effect/mechanism is adequately managed.

In NMP ALRA Section 3.2.2.C.3, the applicant addresses loss of material due to pitting and crevice corrosion of components in the standby gas treatment, containment isolation, and emergency core cooling systems.

In the NMP ALRA, the applicant also states, that for NMP Unit 2, the applicable system is the hydrogen recombiner system. The aging effect/mechanism is managed by NMP AMP B2.1.20, "One-Time Inspection Program."

The project team reviewed the applicant's One-Time Inspection Program and its evaluation is documented in Section 2.19 of this audit and review report.

The project team reviewed the applicant's further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.2.2.2.3.2 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B.2.4 Local Loss of Material Due to Microbiologically Influenced Corrosion (NMP ALRA Section 3.2.2.C.4)

The project team reviewed NMP ALRA Section 3.2.2.C.4 against the criteria in SRP-LR Section 3.2.2.2.4.

The applicant states, in the NMP ALRA, that for the local loss of material due to MIC in containment isolation valves and associated piping, this aging effect/mechanism is not applicable to NMP. NMP considers MIC to be an aging effect/mechanism for systems with raw water as an environment. NMP Unit 2 does not have a raw water environment for containment isolation valves or the associated piping. Therefore, this issue is not applicable for NMP Unit 2. The project team determined through discussions with the applicant's technical staff that the local loss of material due to MIC is not applicable to containment isolation valves and associated piping at NMP Unit 2.

On the basis that NMP Unit 2 does not have any components subject to this aging effect/mechanism, the project team finds that this aging effect/mechanism is not applicable to NMP Unit 2.

3.2B.2.5 Changes in Properties Due to Elastomer Degradation (NMP ALRA Section 3.2.2.C.5)

The project team reviewed NMP ALRA Section 3.2.2.C.5 against the criteria in SRP-LR Section 3.2.2.2.5.

The applicant states, in the NMP ALRA, that for the seals in the standby gas treatment system, this aging effect/mechanism is not applicable to NMP. For NMP Unit 2, the standby gas treatment system does not contain any seals. The project team determined through discussions with the applicant's technical staff that the standby gas treatment system does not contain any seals, therefore, it is not applicable to NMP Unit 2.

On the basis that NMP does not have any components subject to this aging effect/mechanism, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.2B.2.6 Local Loss of Material Due to Erosion (NMP ALRA Section 3.2.2.C.6)

The project team reviewed NMP ALRA Section 3.2.2.C.6 against the criteria in SRP-LR Section 3.2.2.2.6.

The applicant states, in the NMP ALRA, that this issue is applicable only to charging pumps in the chemical and volume control systems of PWRs and is not applicable to NMP.

On the basis that NMP does not have any components subject to this aging effect/mechanism, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.2B.2.7 Buildup of Deposits Due to Corrosion (NMP ALRA Section 3.2.2.C.7)

The project team reviewed NMP ALRA Section 3.2.2.C.7 against the criteria in SRP-LR Section 3.2.2.2.7.

SRP-LR Section 3.2.2.2.7 states that the plugging of components due to general corrosion could occur in the spray nozzles and flow orifices of the drywell and suppression chamber spray system. This aging effect/mechanism and effect will apply since the spray nozzles and flow orifices are occasionally wetted, even though the majority of the time this system is on standby. The wetting and drying of these components can aid in the acceleration of this particular corrosion. The GALL Report recommends further evaluation to ensure that the aging effect/mechanism is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

In NMP ALRA Section 3.2.2.C.7, the applicant addresses the plugging of components due to general corrosion in the spray nozzles and flow orifices of the drywell and suppression chamber spray system.

In the NMP ALRA, the applicant also states, that for NMP Unit 2, the containment spray cooling mode of the residual heat removal system contains the subject spray nozzles and flow orifices. The plugging of spray nozzles due to general corrosion is not an applicable aging effect/mechanism since these components are stainless steel and not susceptible to general corrosion. The plugging of flow orifices due to general corrosion is not an applicable aging effect/mechanism since the lines containing these components are flushed during quarterly testing, which precludes the buildup of deposits.

The project team finds that the applicant has met the criteria of SRP-LR Section 3.2.2.2.7 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.2B.2.8 Quality Assurance for Aging Management of Non-Safety-Related Components (NMP ALRA Section 3.2.2.C.8)

NMP ALRA Section 3.2.2.C.8 is reviewed by the NRR DIPM staff and will be addressed separately in Section 3 of the SER related to the NMP LRA.

Conclusion

On the basis of its review, for component groups evaluated in the GALL Report for which the GALL Report recommends further evaluation, the project team determined that the applicant adequately addressed these issues. For these items, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3A NMP ALRA Unit 1 Section 3.3 - Aging Management of Auxiliary Systems

In NMP ALRA Section 3.3.2, the applicant provided the results of its AMRs for the auxiliary systems.

In NMP ALRA Tables 3.3.2.A-1 through 3.3.2.A-25, the applicant provided a summary of the AMR results for component types associated with the (1) circulating water system; (2) city water system; (3) compressed air system; (4) containment systems; (5) control room HVAC system; (6) diesel generator building ventilation system; (7) emergency diesel generator system; (8) fire detection and protection system; (9) hydrogen water chemistry system; (10) liquid poison system; (11) miscellaneous non-contaminated vents and drains system; (12) neutron monitoring system; (13) radioactive waste solidification and storage building HVAC system; (14) radioactive waste system; (15) reactor building closed loop cooling water system; (16) reactor building HVAC system; (17) reactor water cleanup system; (18) sampling system; (19) service water system; (20) shutdown cooling system; (21) spent fuel pool filtering and cooling system; (22) turbine building closed loop cooling water system; (23) turbine building HVAC system; (24) electric steam boiler system; and (25) makeup and demineralizer system. The summary information for each component type included intended function; material; environment; aging effect/mechanism requiring management; AMPs; the GALL Report Volume 2 item; cross reference to NMP ALRA Table 3.3.1.A (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

For each component type in NMP ALRA Table 3.3.1.A, the applicant identified those component types that are managed in a manner consistent with the GALL Report, component types for which the GALL Report recommends further evaluation, and those AMRs that are not addressed in the GALL Report together with the method proposed for their aging management.

The project team conducted its audit and review in accordance with SRP-LR Section 3.3.3 and the NMP audit and review plan. The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report.

3.3A.1 Aging Management Review Results That Are Consistent with the GALL Report

For aging management evaluations that the applicant states are consistent with the GALL Report, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the NMP ALRA is acceptable.

The project team reviewed its assigned NMP ALRA line items to determine that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects/mechanisms have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects/mechanisms for the circulating water system, city water system, compressed air system, containment systems, control room HVAC system, diesel generator building ventilation system, emergency diesel generator system, fire detection and protection system, hydrogen water chemistry system, liquid poison system, miscellaneous non-contaminated vents and drains system, neutron monitoring system, radioactive waste solidification and storage building HVAC system, radioactive waste system, reactor building closed loop cooling water system, reactor building HVAC system, reactor water cleanup system, sampling system, service water system, shutdown cooling system, spent fuel pool filtering and cooling system, turbine building closed loop cooling water system, turbine building HVAC system, electric steam boiler system, and makeup and demineralizer system components that are subject to an AMR.

The following subparagraphs identify differences, when compared to the GALL Report, that were identified by the project team during the audit and review.

3.3A.1.1 Cumulative Fatigue Damage

In NMP ALRA Table 3.3.1.A, Item 3.3.1.A-03, the applicant states that cumulative fatigue damage is managed using a TLAA.

During the audit and review, the project team asked the applicant to clarify the statement on NMP ALRA (Page 3.3-86) that NMP does not have any TLAA for components in load handling systems. The applicant was asked to provide technical justification demonstrating why this aging effect/mechanism is not applicable to NMP. In a letter dated December 1, 2005, the applicant states that this issue has been screened against the six criteria for a TLAA for NMP. Furthermore in this letter, the applicant states that it was determined that the operating cycles for the cranes did not meet the criteria for a TLAA because (1) there were no actual calculations or analyses in the CLB projecting the number of operating cycles and; (2) for cranes designed to CMAA-70, an estimate of the number of possible operating cycles in 60 years that were a substantial fraction (40-95%) of the crane maximum rated load determined a very small percentage of the allowable number of cycles (for the NMP Unit 2 reactor building polar crane, 1500 cycles versus a minimum allowable number of cycles of 100,000). Therefore, generating a formal calculation of operating cycles for 60 years would not result in any meaningful limitations on the use of the crane; i.e., the calculation would not meet criteria #4 for a TLAA from 10 CFR 54.3 which is, “Were determined to be relevant by the licensee in making a safety determination.”

The project team reviewed the applicant’s response and finds that it provides adequate justification for not having any TLAA for components in load handling systems.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3A.1.2 Crack Initiation and Growth Due to SCC or Cracking

In the discussion section of NMP ALRA Table 3.3.1.A, Item 3.3.1.A-04, the applicant states that for stainless steel heat exchangers, aging management is provided by NMP AMP B2.1.2, “Water Chemistry Control Program,” and NMP AMP B2.1.32, “Preventive Maintenance Program.” However, during the audit and review, the project team noted that the applicant has applied NMP ALRA Table 3.3.1, Item 3.3.1.A-04 to manage cracking in wrought austenitic stainless steel in a treated water or steam environment with temperatures greater than or equal to 140EF or less than 212EF using its Water Chemistry Control Program and NMP AMP B2.1.20, “One-Time Inspection Program.” The project team asked the applicant to identify the AMPs which are to be applied. In a letter dated December 1, 2005, the applicant states that NMP ALRA Table 3.3.1.A, Item 3.3.1.A-04 is to be revised to read that further evaluation is documented in Appendices B2.1.2 (Water Chemistry Control Program) and B2.1.20 (One-Time Inspection Program).

The project team reviewed the applicant's response and finds it consistent with the GALL Report and therefore acceptable.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3A.1.3 Loss of Material Due to General, Pitting, and Crevice Corrosion, and MIC

During the audit and review, the project team noted that the applicant had cited NMP ALRA Table 3.3.1.A, Item 3.3.1.A-15 a number of times and had assigned Notes A, B, C, or D even though no exception to GALL AMP XI.M21, "Closed-Cycle Cooling Water System," had been taken in NMP AMP B2.1.11, "Closed-Cycle Cooling Water System Program." The applicant was asked to clarify the basis for the assignment of Notes B and D. In a letter dated December 1, 2005, the applicant states that the notes are all A unless a GALL Report Item does not address a specific component type, in which case the Note is C. Also, the applicant states that the notes for pumps, tanks, and valves line items referencing NMP ALRA Table 3.3.1.A-15 (three places on Pages 3.3-137, 3.3-138 and 3.3-139) are revised from Note B to Note A. In addition, the applicant states that in NMP ALRA Tables 3.2.2.A-1 (Page 3.2-38) and 3.3.2.A-21 (Page 3.3-197) for gray cast iron pumps where the GALL Report Item and this Table 1 Item are being removed and Note E is being replaced with Note H. Finally, the applicant states in this letter that there is also reference to this Table 1 Item for GCI HXs in NMP ALRA Table 3.3.2.A-7. The note used for this line is Note D; however, it should be Note C since the component is a HX instead of a pump. The project team reviewed the applicant's response and finds it acceptable because the applicant has assigned the appropriate notes to the AMR line items.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3A.1.4 Loss of Material Due to General Corrosion and Wear

During the audit and review, the project team noted that in NMP ALRA Table 3.5.2.A-4 (Page 3.5-74) for component type refueling platform and aging effect/mechanism loss of material, the Table1 line item shown is 3.3.1.B-16. During the audit and review, the project team asked the applicant to explain why a NMP Unit 2 line item is shown with a NMP Unit 1 component type.

In a letter dated December 1, 2005, the applicant states that the occurrence is an error. For NMP ALRA Table 3.5.2.A-4 (Page 3.5-74) with line item component type refueling platform and aging effect/mechanism loss of material, the Table 1 reference is changed from Item 3.3.1.B-16 to Item 3.3.1.A-16.

The project team reviewed the applicant's response and finds the correction of the reference to NMP ALRA Table 3.3.1.A, Item 3.3.1.A-16 acceptable.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3A.1.5 Loss of Material Due to Wear; Hardening and Shrinkage Due to Weathering

In NMP ALRA Table 3.5.2.A-11 (Page 3.5-85), the applicant references NMP ALRA Table 3.3.1.A, Item 3.3.1.A-20.

During the audit and review, the project team noted that for component type doors and aging effect/mechanism loss of material, the Note shown is C, which indicates that the NMP AMP shown is consistent with the GALL Report AMP. However, the AMP shown is NMP AMP B2.1.16, “Fire Protection Program,” for which the applicant takes some exceptions to the GALL AMP XI.M26, “Fire Protection.” The project team asked the applicant to explain why a Note C was shown instead of a Note D. This also applies to NMP ALRA Table 3.5.2.A-6 (Page 3.5-76), NMP ALRA Table 3.5.2.A-7 (Page 3.5-78) and NMP ALRA Table 3.5.2.A-11 (Page 3.5-85) for component type doors, aging effect/mechanism of loss of material managed by the applicant’s Fire Protection Program.

In a letter dated December 1, 2005, the applicant states that the note entry should be Note D instead of C. Note C is changed to Note D for NMP ALRA Tables 3.5.2.A-11, 3.5.2.A-6, and 3.5.2.A-7 with AMR line item component doors, aging effect/mechanism of loss of material managed by the applicant’s Fire Protection Program.

The project team reviewed the applicant’s response and finds it acceptable because, with the correction of Note C to Note D, the proper note is assigned to these AMR line items.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3A.1.6 Loss of Material Due to General Corrosion; Crack Initiation and Growth Due to Cyclic Loading and SCC

During the audit and review, the project team noted that in NMP ALRA Table 3.3.2.A-10 (Page 3.3-147) for component type bolting and aging effect/mechanism of loss of material or cracking, the Note shown is B, which indicates that, for the NMP AMP shown, the applicant has taken an exception to the GALL Report AMP. However, the AMP shown is NMP AMP B2.1.36, “Bolting Integrity Program,” for which the applicant claims is consistent with the GALL AMP XI.M18, “Bolting Integrity.” The project team asked the applicant to explain why a Note B was shown instead of a Note A. In a letter dated December 1, 2005, the applicant states that Note B is appropriate because, based on its letter dated September 15, 2005, an exception was declared for the applicant’s Bolting Integrity Program. Based on a review of the applicant’s response, the project team finds that the applicant is correct and the appropriate note is assigned to the AMR line items.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

Conclusion

The project team has evaluated the applicant's claim of consistency with the GALL Report. The project team also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects/mechanisms. On the basis of its review, the project team finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the project team finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3A.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL Report

For some line items assigned to the project team in NMP ALRA Tables 3.3.2.A-1 through 3.3.2.A-25, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in NMP ALRA Section 3.3.2.C against the criteria provided in SRP-LR Section 3.3.2.2. The project team's assessments of these evaluations are documented in this section. These assessments are applicable to each Table 2 line item in NMP ALRA Section 3.3.2 that includes a reference to the item in Table 1 for which further evaluation is recommended.

3.3A.2.1 Loss of Material Due to General, Pitting, and Crevice Corrosion (NMP ALRA Section 3.3.2.C.1)

3.3A.2.1.1 Loss of Material Due to General, Pitting, and Crevice Corrosion (NMP ALRA Section 3.3.2.C.1)

The project team reviewed NMP ALRA Section 3.3.2.C.1 against the criteria in SRP-LR Section 3.3.2.2.1.1.

SRP-LR Section 3.3.2.2.1.1 states that loss of material due to general, pitting, and crevice corrosion could occur in the channel head and access cover, tubes, and tubesheets of the heat exchanger in the spent fuel pool cooling and cleanup. The Water Chemistry Program relies on monitoring and control of reactor water chemistry based on the EPRI guidelines of BWRVIP-29, (TR-103515), "BWR Water Chemistry Guidelines - Normal and Hydrogen Water Chemistry," to manage the effects of loss of material from general, pitting or crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause general, pitting, or crevice corrosion. Therefore, verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from general, pitting, and crevice corrosion to verify the effectiveness of the applicant's Water Chemistry Program. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

In NMP ALRA Section 3.3.2.C.1, the applicant addresses loss of material due to general, pitting, and crevice corrosion for components in the spent fuel pool cooling and cleanup system. For NMP Unit 1, components in the spent fuel pool cooling systems are managed by the combination of NMP AMP B2.1.6, “Water Chemistry Control Program,” and NMP AMP B2.1.20, “One-Time Inspection Program.”

The project team reviewed the applicant’s Water Chemistry Control and One-Time Inspection Programs and its evaluations are documented in Sections 2.2 and 2.19 of this audit and review report, respectively.

The project team reviewed the applicant’s further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.1.1 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3A.2.1.2 Loss of Material Due to General, Pitting, and Crevice Corrosion (NMP ALRA Section 3.3.2.C.1)

The project team reviewed NMP ALRA Section 3.3.2.C.1 against the criteria in SRP-LR Section 3.3.2.2.1.2.

SRP-LR Section 3.3.2.2.1.2 states that loss of material due to pitting and crevice corrosion could occur in the piping, filter housing, valve bodies, and shell and nozzles of the ion exchanger in the spent fuel pool cooling and cleanup system, and in the piping and pump casing in the shutdown cooling system (older BWR). The Water Chemistry Program relies on monitoring and control of reactor water chemistry based on EPRI guidelines of BWRVIP-29 (TR-103515), “BWR Water Chemistry Guidelines - Normal and Hydrogen Water Chemistry,” to manage the effects of loss of material from pitting or crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause pitting, or crevice corrosion. Therefore, verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from pitting and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component’s intended function will be maintained during the period of extended operation.

In NMP ALRA Section 3.3.2.C.1, the applicant addresses loss of material due to pitting and crevice corrosion of components in the spent fuel cooling and cleanup system and the shutdown cooling system of older BWRs.

In the NMP ALRA, the applicant also states, that for NMP Unit 1, the applicable systems are the reactor water cleanup and shutdown cooling systems. The aging effect/mechanism is managed by the combination of the NMP AMP B2.1.6, “Water Chemistry Control Program,” and NMP AMP B2.1.20, “One-Time Inspection Program.”

The project team reviewed the applicant’s Water Chemistry Control and One-Time Inspection Programs and its evaluations are documented in Sections 2.2 and 2.19 of this audit and review report, respectively.

The project team reviewed the applicant’s further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.1.2 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3A.2.2 <u>Hardening and Cracking or Loss of Strength Due to Elastomer Degradation or Loss of Material Due to Wear (NMP ALRA Section 3.3.2.C.2)</u>

The project team reviewed NMP ALRA Section 3.3.2.C.2 against the criteria in SRP-LR Section 3.3.2.2.2.

SRP-LR Section 3.3.2.2.2 states that hardening and cracking due to elastomer degradation could occur in elastomer linings of the filter, valve, and ion exchangers in spent fuel pool cooling and cleanup systems. Hardening and loss of strength due to elastomer degradation could occur in the collars and seals of the duct and in the elastomer seals of the filters in the control room area, auxiliary and radwaste area, and primary containment heating ventilation systems and in the collars and seals of the duct in the diesel generator building ventilation system. Loss of material due to wear could occur in the collars and seals of the duct in the ventilation systems. The GALL Report recommends further evaluation to ensure that these aging effects/mechanisms are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

In NMP ALRA Section 3.3.2.C.2, the applicant addresses aging effects/mechanisms that could occur for the elastomer lining of some components exposed to the treated water environment of the spent fuel pool cooling system and elastomer seals and collars in the ductwork of certain ventilation systems exposed to a range of atmospheric conditions.

In the NMP ALRA, the applicant also states, that elastomers are not used in the lining of spent fuel pool system components within the scope of license renewal at NMP.

In addition, the applicant states, that for NMP Unit 1 ventilation systems, the aging effects/mechanisms for seals and collars are managed by NMP AMP B2.1.32, “Preventive Maintenance Program.” The applicant’s Preventive Maintenance Program is reviewed by the

NRR DE staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA.

The project team reviewed the applicant's further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the program identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.2 for further evaluation. Predicated on DE acceptance of the applicant's Preventive Maintenance Program, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3A.2.3 Cumulative Fatigue Damage (NMP ALRA Section 3.3.2.C.3)

NMP ALRA Section 3.3.2.C.3 is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The TLAA is reviewed by the NRR DE staff. The evaluation of this TLAA will be addressed separately in Section 4 of the SER related to the NMP ALRA.

3.3A.2.4 Crack Initiation and Growth Due to Cracking or Stress Corrosion Cracking (NMP ALRA Section 3.3.2.C.4)

The project team reviewed NMP ALRA Section 3.3.2.C.4 against the criteria in SRP-LR Section 3.3.2.2.4.

SRP-LR Section 3.3.2.2.4 states that crack initiation and growth due to SCC could occur in the regenerative and non-regenerative heat exchanger components in the reactor water cleanup system. The GALL Report recommends further evaluation to ensure that these aging effects/mechanisms are managed adequately. Acceptance criteria are described in Branch Technical Position RLSB-1.

In NMP ALRA Section 3.3.2.C.4, the applicant addresses cracking due to SCC for the stainless steel reactor water cleanup system regenerative and non-regenerative heat exchangers.

In the NMP ALRA, the applicant also states, that for NMP Unit 1, this aging effect/mechanism for the reactor water cleanup system regenative and non-regenative heat exchangers is managed by the combination of NMP AMP B2.1.2, "Water Chemistry Control Program," and NMP AMP B2.1.20, "One-Time Inspection Program."

The project team reviewed the applicant's Water Chemistry Control and One-Time Inspection Programs and its evaluations are documented in Sections 2.2 and 2.19 of this audit and review report, respectively.

The project team reviewed the applicant's further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.4 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3A.2.5 <u>Loss of Material Due to General, Microbiologically Influenced, Pitting, and Crevice Corrosion (NMP ALRA Section 3.3.2.C.5)</u>

The project team reviewed NMP ALRA Section 3.3.2.C.5 against the criteria in SRP-LR Section 3.3.2.2.5.

SRP-LR Section 3.3.2.2.5 states that loss of material due to general, pitting, and crevice corrosion could occur in the piping and filter housing and supports in the control room area, the auxiliary and radwaste area, the primary containment heating and ventilation systems, in the piping of the diesel generator building ventilation system, in the aboveground piping and fittings, valves, and pumps in the diesel fuel oil system and in the diesel engine starting air, combustion air intake, and combustion air exhaust subsystems in the emergency diesel generator system. Loss of material due to general, pitting, crevice, and MIC could occur in the duct fittings, access doors, and closure bolts, equipment frames and housing of the duct, due to pitting and crevice corrosion could occur in the heating/cooling coils of the air handler heating/cooling, and due to general corrosion could occur on the external surfaces of all carbon steel structures and components, including bolting exposed to operating temperatures less than 212EF in the ventilation systems. The GALL Report recommends further evaluation to ensure that these aging effects/mechanisms are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

In NMP ALRA Section 3.3.2.C.5, the applicant addresses loss of material from corrosion that could occur on internal and external surfaces of components exposed to a range of atmospheric conditions. Specifically included in the subsection are the ventilation systems, the diesel generator systems' fuel oil, starting air, and combustion air intake and exhaust subsystems, and auxiliary systems' external carbon steel surfaces within the scope of license renewal.

In the NMP ALRA, the applicant also states, that for NMP Unit 1, this aging effect/mechanism is managed by NMP AMP B2.1.11, “Closed-Cycle Cooling Water Program,” NMP AMP B2.1.17, “Fire Water System Program,” NMP AMP B2.1.20, “One-Time Inspection Program,” NMP AMP B2.1.26, “10 CFR 50 Appendix J Program,” NMP AMP B2.1.32, “Preventive Maintenance Program,” and NMP AMP B2.1.33, “Systems Walkdown Program,” for the applicable systems and components.

The applicant’s Preventive Maintenance and Systems Walkdown Programs are reviewed by the NRR DE staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA. The project team reviewed the applicant’s Closed-Cycle Cooling Water, Fire Water System, One-Time Inspection and 10 CFR 50 Appendix J Programs and its evaluations are documented in Sections 2.11, 2.17, 2.19, and 2.25 of this audit and review report, respectively.

The project team reviewed the applicant's further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.5 for further evaluation. Predicated on DE acceptance of the applicant's Preventive Maintenance and Systems Walkdown Programs, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3A.2.6 <u>Loss of Material Due to General, Galvanic, Pitting, and Crevice Corrosion (NMP ALRA Section 3.3.2.C.6)</u>

The project team reviewed NMP ALRA Section 3.3.2.C.6 against the criteria in SRP-LR Section 3.3.2.2.6.

The applicant states, in the NMP ALRA, that for loss of material due to general, galvanic, pitting, and crevice corrosion in the reactor recirculation pumps' oil collection system in fire protection, this item is not applicable since NMP does not have oil collection systems for its reactor recirculation pumps. The project team determined through discussions with the applicant's technical staff that for loss of material due to general, galvanic, pitting, and crevice corrosion in the reactor recirculation pumps' oil collection system in fire protection, this item is not applicable since NMP does not have oil collection systems for its reactor recirculation pumps.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.3A.2.7 <u>Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion and Biofouling (NMP ALRA Section 3.3.2.C.7)</u>

The project team reviewed NMP ALRA Section 3.3.2.C.7 against the criteria in SRP-LR Section 3.3.2.2.7.

SRP-LR Section 3.3.2.2.7 states that loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling could occur in the internal surface of tanks in the diesel fuel oil system and due to general, pitting, and crevice corrosion and MIC in the tanks of the diesel fuel oil system in the emergency diesel generator system. The existing aging management program relies on the Fuel Oil Chemistry Program for monitoring and control of fuel oil contamination in accordance with the guidelines of ASTM Standards D4057, D1796, D2709 and D2276 to manage loss of material due to corrosion or biofouling. Corrosion or biofouling may occur at locations where contaminants accumulate. Verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring. The

GALL Report recommends further evaluation of programs to manage corrosion/biofouling to verify the effectiveness of the program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

In NMP ALRA Section 3.3.2.C.7, the applicant addresses loss of material due to general, pitting, crevice, and MIC and biofouling for the internal surfaces of components in the diesel fuel oil system.

The applicant also states, in the NMP ALRA, that for NMP Unit 1, this aging effect/mechanism is managed by the combination of NMP AMP B2.1.18, "Fuel Oil Chemistry Program," and NMP AMP B2.1.20, "One-Time Inspection Program."

The project team reviewed the applicant's Fuel Oil Chemistry and One-Time Inspection Programs and its evaluations are documented in Sections 2.18 and 2.19 of this audit and review report, respectively.

The project team reviewed the applicant's further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.7 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3A.2.8 Quality Assurance for Aging Management of Non-Safety-Related Components (NMP ALRA Section 3.3.2.C.8)

NMP ALRA Section 3.3.2.C.8 is reviewed by the NRR DIPM staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA.

3.3A.2.9 Crack Initiation and Growth Due to Stress Corrosion Cracking and Cyclic Loading (NMP ALRA Section 3.3.2.C.9)

The project team reviewed NMP ALRA Section 3.3.2.C.9 against the criteria in SRP-LR Section 3.3.2.2.9.

The applicant states, in the NMP ALRA, that since crack initiation and growth due to stress corrosion cracking and cyclic loading applies to PWRs only, this aging effect/mechanism is not applicable to NMP. The project team determined through discussions with the applicant's technical staff that since this applies to PWRs only, it is not applicable to NMP.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.3A.2.10 Reduction of Neutron-Absorbing Capacity and Loss of Material Due to General Corrosion (NMP ALRA Section 3.3.2.C.10)

The project team reviewed NMP ALRA Section 3.3.2.C.10 against the criteria in SRP-LR Section 3.3.2.2.10.

SRP-LR Section 3.3.2.2.10 states that reduction of neutron-absorbing capacity and loss of material due to general corrosion could occur in the neutron-absorbing sheets of the spent fuel storage rack in the spent fuel storage. The GALL Report recommends further evaluation to ensure that these aging effects/mechanisms are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

The applicant states, in the NMP ALRA, that for the reduction of neutron-absorbing capacity and loss of material due to general corrosion in the neutron-absorbing (Boral or boron steel) sheets of the spent fuel storage racks, this aging effect/mechanism is not applicable since NMP identified no aging effects/mechanisms for these components. The project team determined through discussions with the applicant’s technical staff that the reduction of neutron-absorbing capacity and loss of material due to general corrosion in the neutron-absorbing (Boral or boron steel) sheets of the spent fuel storage racks is not applicable at NMP since no aging effects/mechanisms were identified for these components.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.3A.2.11 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion (NMP ALRA Section 3.3.2.C.11)

The project team reviewed NMP ALRA Section 3.3.2.C.11 against the criteria in SRP-LR Section 3.3.2.2.11.

SRP-LR Section 3.3.2.2.11 states that loss of material due to general, pitting, and crevice corrosion and MIC could occur in the underground piping and fittings in the open-cycle cooling water system (service water system) and in the diesel fuel oil system. The Buried Piping and Tanks Inspection Program relies on industry practice, frequency of pipe excavation, and operating experience to manage the effects of loss of material from general, pitting, and crevice corrosion and MIC. The effectiveness of the applicant’s Buried Piping and Tanks Inspection Program should be verified to evaluate an applicant’s inspection frequency and operating experience with buried components, ensuring that loss of material is not occurring.

In NMP ALRA Section 3.3.2.C.11, the applicant addresses loss of material due to general, pitting, crevice, and microbiologically influenced corrosion for buried piping and fittings.

In the NMP ALRA, the applicant also states, that this aging effect/mechanism is managed by NMP AMP B2.1.22, “Buried Piping and Tanks Inspection Program,” for NMP Unit 1 diesel generator systems.

The project team reviewed the applicant's Buried Piping and Tanks Inspection Program and its evaluation is documented in Section 2.21 of this audit and review report.

During the audit and review, the project team asked the applicant to clarify its position relative to opportunistic inspections prior to the period of extended operation. In a letter dated December 1, 2005, the applicant states that the NMP ALRA will be revised to include the following in its Buried Piping and Tanks Inspection Program:

> Program activities will include visual inspections of external coatings and wrappings to detect damage and degradation. Prior to entering the period of extended operation, NMPNS will verify that there has been at least one opportunistic or focused inspection within the past ten years. Upon entering the period of extended operation, NMPNS will perform a focused inspection within ten years, unless an opportunistic inspection occurred within this ten year period. All credited inspections will be performed in areas with the highest likelihood of corrosion problems, and in areas with a history of corrosion problems.

Based on a review of the applicant's clarification of its visual inspection position and the applicant's further evaluation described above, the project team concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the program identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.11 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

Conclusion

On the basis of its review, for component groups evaluated in the GALL Report for which the GALL Report recommends further evaluation, the project team determined that the applicant adequately addressed these issues. For these items, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3B NMP ALRA Unit 2 Section 3.3 - Aging Management of Auxiliary Systems

In NMP ALRA Section 3.3.2, the applicant provided the results of its AMRs for the auxiliary systems.

In NMP ALRA Tables 3.3.2.B-1 through 3.3.2.B-40, the applicant provided a summary of the AMR results for component types associated with the (1) air startup standby diesel generator system; (2) alternate decay heat removal system; (3) auxiliary service building HVAC system; (4) chilled water ventilation system; (5) compressed air systems; (6) containment atmosphere monitoring system; (7) containment leakage monitoring system; (8) control building chilled water system; (9) control building HVAC system; (10) diesel generator building ventilation system; (11) domestic water system; (12) engine-driven fire pump fuel oil system; (13) fire detection and protection system; (14) floor and equipment drains system; (15) generator standby lube oil system; (16) glycol heating system; (17) hot water heating system; (18) makeup water system; (19) neutron monitoring system; (20) primary containment purge system; (21) process sampling system; (22) reactor building closed loop cooling water system; (23) reactor building HVAC system; (24) reactor water cleanup system; (25) seal water system; (26) service water system; (27) spent fuel pool cooling and cleanup system; (28) standby diesel generator fuel oil system; (29) standby diesel generator protection (generator) system; (30) standby liquid control system; (31) yard structures ventilation system; (32) radiation monitoring system; (33) auxiliary boiler system; (34) circulating water system; (35) makeup water treatment system; (36) radioactive liquid waste management system; (37) roof drainage system; (38) sanitary drains and disposal system; (39) service water chemical treatment system; (40) turbine building closed loop cooling water system. The summary information for each component type included intended function; material; environment; aging effect/mechanism requiring management; AMPs; the GALL Report Volume 2 item; cross reference to NMP ALRA Table 3.3.1.B (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

For each component type in NMP ALRA Table 3.3.1.B, the applicant identified those component types that are managed in a manner consistent with the GALL Report, component types for which the GALL Report recommends further evaluation, and those AMRs that are not addressed in the GALL Report together with the method proposed for their aging management.

The project team conducted its audit and review in accordance with SRP-LR Section 3.3.3 and the NMP audit and review plan. The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report.

3.3B.1 Aging Management Review Results That Are Consistent with the GALL Report

For aging management evaluations that the applicant states are consistent with the GALL Report, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the NMP ALRA is acceptable.

The project team reviewed its assigned NMP ALRA line items to determine that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects/mechanisms have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects/mechanisms for the air startup standby diesel generator system, alternate decay heat removal system, auxiliary service building HVAC system, chilled water ventilation system, compressed air systems, containment atmosphere monitoring system, containment leakage monitoring system, control building chilled water system, control building HVAC system, diesel generator building ventilation system, domestic water system, engine-driven fire pump fuel oil system, fire detection and protection system, floor and equipment drains system, generator standby lube oil system, glycol heating system, hot water heating system, makeup water system, neutron monitoring system, primary containment purge system, process sampling system, reactor building closed loop cooling water system, reactor building HVAC system, reactor water cleanup system, seal water system, service water system, spent fuel pool cooling and cleanup system, standby diesel generator fuel oil system, standby diesel generator protection (generator) system, standby liquid control system, yard structures ventilation system, radiation monitoring system, auxiliary boiler system, circulating water system, makeup water treatment system, radioactive liquid waste management system, roof drainage system, sanitary drains and disposal system, service water chemical treatment system, and turbine building closed loop cooling water system components that are subject to an AMR.

The following subparagraphs identify differences, when compared to the GALL Report, that were identified by the project team during the audit and review.

3.3B.1.1 Loss of Material Due to General, Pitting, and Crevice Corrosion, and MIC

During the audit and review, the project team noted that in NMP ALRA Table 3.3.2.B-5 (Page 3.3-213) for component type bolting and aging effect/mechanism loss of material, the applicant is managing this aging effect/mechanism with NMP AMP B2.1.26, "Bolting Integrity Program." In a letter dated September 15, 2005, the applicant identified an exception to this program based upon the ASME code edition being used. During the audit and review, the project team asked the applicant to clarify why a Note A was assigned to this line item.

In a letter dated December 1, 2005, the applicant states that the occurrence is an error. The NMP ALRA will be revised so that for each AMR line item crediting the applicant's Bolting Integrity Program, the note will be changed from Note A to Note B.

The project team reviewed the applicant's response and finds it acceptable because, with the correction of Note A to Note B, the proper note is assigned to these AMR line items.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3B.1.2 Loss of Material Due to General, Pitting, and Crevice Corrosion, MIC, and Fouling

During the audit and review, the project team noted that in NMP ALRA Table 3.3.2.B-28 (Page 3.3-279) for component type tanks and aging effect/mechanism of loss of material, the applicant is managing this aging effect/mechanism with NMP AMP B2.1.18, "Fuel Oil Chemistry Program." The project team asked the applicant to clarify why a Note A was assigned to this line item since its Fuel Oil Chemistry Program takes an exception to GALL AMP XI.M30, "Fuel Oil Chemistry."

In a letter dated December 1, 2005, the applicant states that the occurrence is an error. The NMP ALRA will be revised so that for this AMR line item the note will be changed from Note A to Note B.

The project team reviewed the applicant's response and finds it acceptable because, with the correction of Note A to Note B, the proper note is assigned to the AMR line item.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3B.1.3 Loss of Material Due to General, Pitting, and Crevice Corrosion, and MIC

During the audit and review, the project team noted that in NMP ALRA Table 3.3.2.B-29 (Page 3.3-282) for component type heat exchangers and aging effect/mechanism of loss of material, the applicant is managing this aging effect/mechanism with NMP AMP B2.1.10, "Open-Cycle Cooling Water System Program." The project team asked the applicant to clarify why NMP ALRA Table 3.3.1.B, Item 3.3.1.B-15 was applied which is for closed-cycle cooling water environments.

In a letter dated December 1, 2005, the applicant states that the occurrence is an error. The NMP ALRA will be revised so that the Table 1 reference will be changed from NMP ALRA Table 3.3.1.B, Item 3.3.1.B-15 to NMP ALRA Table 3.3.1.B, Item 3.3.1.B-17.

On the basis of its review of the applicant's response, the project team finds the correction of the Table 1 reference acceptable because it is for an open-cycle cooling water environment.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.3B.1.4 Loss of Material Due to General, Pitting, and Crevice Corrosion

During the audit and review, the project team noted that in NMP ALRA Table 3.3.2.B-28 (Page 3.3-279) for component type tanks and aging effect/mechanism of loss of material, the applicant is managing this aging effect/mechanism with NMP AMP B2.1.32, "Preventive Maintenance Program." The project team asked the applicant to confirm that all surfaces of the tank are accessible for visual inspection. During the audit and review, the applicant provided documentation confirming that all external surfaces of the tank are accessible for visual inspection. Furthermore, in response to this question, the applicant noted that this line item was supposed to have been removed in the NMP ALRA.

In a letter dated December 1, 2005, the applicant states that the NMP ALRA will be revised to delete the line item for loss of material that is addressed by its Preventive Maintenance Program. The applicant further states in this letter that NMP ALRA Table 3.3.2.B-28 has a carbon steel component type of external surfaces aging management line item that is managed by NMP AMP B2.1.33, "Systems Walkdown Program," and the ties to its Preventive Maintenance Program were meant to be removed.

The applicant's Systems Walkdown Program is reviewed by the NRR DE staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA.

The project team reviewed the applicant's response and finds that, predicated on DE acceptance of the applicant's Systems Walkdown Program, this is consistent with the GALL Report and therefore acceptable.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

Conclusion

The project team has evaluated the applicant's claim of consistency with the GALL Report. The project team also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects/mechanisms. On the basis of its review, the project team finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the project team finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3B.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL Report

For some line items assigned to the project team in NMP ALRA Tables 3.3.2.B-1 through 3.3.2.B-40, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in NMP ALRA Section 3.3.2.C against the criteria provided in SRP-LR Section 3.3.2.2. The project team's assessments of these evaluations are documented in this section. These assessments are applicable to each Table 2 line item in NMP ALRA Section 3.3.2 that includes a reference to the item in Table 1 for which further evaluation is recommended.

3.3B.2.1 Loss of Material Due to General, Pitting, and Crevice Corrosion (NMP ALRA Section 3.3.2.C.1)

3.3B.2.1.1 Loss of Material Due to General, Pitting, and Crevice Corrosion (NMP ALRA Section 3.3.2.C.1)

The project team reviewed NMP ALRA Section 3.3.2.C.1 against the criteria in SRP-LR Section 3.3.2.2.1.1.

SRP-LR Section 3.3.2.2.1.1 states that loss of material due to general, pitting, and crevice corrosion could occur in the channel head and access cover, tubes, and tubesheets of the heat exchanger in the spent fuel pool cooling and cleanup. The Water Chemistry Program relies on monitoring and control of reactor water chemistry based on EPRI guidelines of BWRVIP-29 (TR-103515), "BWR Water Chemistry Guidelines - Normal and Hydrogen Water Chemistry," to manage the effects of loss of material from general, pitting or crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause general, pitting, or crevice corrosion. Therefore, verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from general, pitting, and crevice corrosion to verify the effectiveness of the applicant's Water Chemistry Program. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

In NMP ALRA Section 3.3.2.C.1, the applicant addresses loss of material due to general, pitting, and crevice corrosion for components in the spent fuel pool cooling and cleanup system. For NMP Unit 2, components in the spent fuel pool cooling systems are managed by the combination of NMP AMP B2.1.2, "Water Chemistry Control Program," and NMP AMP B2.1.20, "One-Time Inspection Program."

The project team reviewed the applicant's Water Chemistry Control and One-Time Inspection Programs and its evaluations are documented in Sections 2.2 and 2.19 of this audit and review report, respectively.

The project team reviewed the applicant's further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.1.1 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3B.2.1.2 Loss of Material Due to General, Pitting, and Crevice Corrosion (NMP ALRA Section 3.3.2.C.1)

The project team reviewed NMP ALRA Section 3.3.2.C.1 against the criteria in SRP-LR Section 3.3.2.2.1.2.

SRP-LR Section 3.3.2.2.1.2 states that loss of material due to pitting and crevice corrosion could occur in the piping, filter housing, valve bodies, and shell and nozzles of the ion exchanger in the spent fuel pool cooling and cleanup system and in the piping and pump casing in the shutdown cooling system (older BWR). The Water Chemistry Program relies on monitoring and control of reactor water chemistry based on EPRI guidelines of BWRVIP-29 (TR-103515), "BWR Water Chemistry Guidelines - Normal and Hydrogen Water Chemistry," to manage the effects of loss of material from pitting or crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause pitting, or crevice corrosion. Therefore, verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material from pitting and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

The applicant states, in the NMP ALRA, that for the loss of material due to general, pitting, and crevice corrosion for components in the spent fuel pool cooling and cleanup system, this aging effect/mechanism is not applicable to NMP Unit 2. NMP Unit 2, is not an older BWR and does not have a shutdown cooling system. Therefore, this item is not applicable. The project team determined through discussions with the applicant's technical staff that NMP Unit 2 is not an older BWR and does not have a shutdown cooling system. Therefore, the project team agrees that this item is not applicable to NMP Unit 2.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.3B.2.2 Hardening and Cracking or Loss of Strength Due to Elastomer Degradation or Loss of Material Due to Wear (NMP ALRA Section 3.3.2.C.2)

The project team reviewed NMP ALRA Section 3.3.2.C.2 against the criteria in SRP-LR Section 3.3.2.2.2.

SRP-LR Section 3.3.2.2.2 states that hardening and cracking due to elastomer degradation could occur in elastomer linings of the filter, valve, and ion exchangers in spent fuel pool cooling and cleanup systems. Hardening and loss of strength due to elastomer degradation could occur in the collars and seals of the duct and in the elastomer seals of the filters in the control room area, auxiliary and radwaste area, and primary containment heating ventilation systems and in the collars and seals of the duct in the diesel generator building ventilation system. Loss of material due to wear could occur in the collars and seals of the duct in the ventilation systems. The GALL Report recommends further evaluation to ensure that these aging effects/mechanisms are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

In NMP ALRA Section 3.3.2.C.2, the applicant addresses aging effects/mechanisms that could occur for the elastomer lining of some components exposed to the treated water environment of the spent fuel pool cooling system and elastomer seals and collars in the ductwork of certain ventilation systems exposed to a range of atmospheric conditions.

In the NMP ALRA, the applicant also states, that elastomers are not used in the lining of spent fuel pool system components within the scope of license renewal at NMP.

In addition, the applicant states, that for NMP Unit 2 ventilation systems, the aging effects/mechanisms for seals and collars are managed by NMP AMP B2.1.32, "Preventive Maintenance Program."

The applicant's Preventive Maintenance Program is reviewed by the NRR DE staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA.

The project team reviewed the applicant's further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.2 for further evaluation. Predicated on DE acceptance of the applicant's Preventive Maintenance Program, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3B.2.3 Cumulative Fatigue Damage (NMP ALRA Section 3.3.2.C.3)

NMP ALRA Section 3.3.2.C.3 is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The TLAA is reviewed by the NRR DE staff. The evaluation of this TLAA will be addressed separately in Section 4 of the SER related to the NMP ALRA.

3.3B.2.4 Crack Initiation and Growth Due to Cracking or Stress Corrosion Cracking (NMP ALRA Section 3.3.2.C.4)

The project team reviewed NMP ALRA Section 3.3.2.C.4 against the criteria in SRP-LR Section 3.3.2.2.4.

SRP-LR Section 3.3.2.2.4 states that crack initiation and growth due to SCC could occur in the regenerative and non-regenerative heat exchanger components in the reactor water cleanup system. The GALL Report recommends further evaluation to ensure that these aging effects/mechanisms are managed adequately. Acceptance criteria are described in Branch Technical Position RLSB-1.

In NMP ALRA Section 3.3.2.C.4, the applicant addresses cracking due to SCC for the stainless steel reactor water cleanup system regenerative and non-regenerative heat exchangers.

In the NMP ALRA, the applicant also states, that for NMP Unit 2, this aging effect/mechanism is not applicable to the reactor water cleanup system regenative and non-regenative heat exchangers since only the carbon steel shells are within the scope of license renewal and subject to an AMR. Cracking is not an applicable aging effect/mechanism for this material in the system environment. The project team determined through discussions with the applicant's technical staff that this is not an applicable aging effect/mechanism for NMP Unit 2 based on the use of carbon steel in the heat exchanger shells and not susceptible to cracking due to SCC. Therefore, this item is not applicable to NMP Unit 2.

On the basis that NMP Unit 2 does not have any regenerative or non-regenerative heat exchanger components in the reactor water cleanup system that are susceptible to cracking due to SCC within the scope of license renewal, the project team finds that this aging effect/mechanism is not applicable to NMP Unit 2.

3.3B.2.5 Loss of Material Due to General, Microbiologically Influenced, Pitting, and Crevice Corrosion (NMP ALRA Section 3.3.2.C.5)

The project team reviewed NMP ALRA Section 3.3.2.C.5 against the criteria in SRP-LR Section 3.3.2.2.5.

SRP-LR Section 3.3.2.2.5 states that loss of material due to general, pitting, and crevice corrosion could occur in the piping and filter housing and supports in the control room area, the auxiliary and radwaste area, the primary containment heating and ventilation systems, in the piping of the diesel generator building ventilation system, in the aboveground piping and fittings, valves, and pumps in the diesel fuel oil system and in the diesel engine starting air, combustion air intake, and combustion air exhaust subsystems in the emergency diesel generator system. Loss of material due to general, pitting, crevice, and MIC could occur in the duct fittings, access doors, and closure bolts, equipment frames and housing of the duct, due to pitting and crevice corrosion could occur in the heating/cooling coils of the air handler heating/cooling, and due to general corrosion could occur on the external surfaces of all carbon steel structures and components, including bolting exposed to operating temperatures less than 212EF in the ventilation systems. The GALL Report recommends further evaluation to ensure that these aging effects/mechanisms are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

In NMP ALRA Section 3.3.2.C.5, the applicant addresses loss of material from corrosion that could occur on internal and external surfaces of components exposed to a range of atmospheric conditions. Specifically included in the subsection are the ventilation systems, the diesel generator systems' fuel oil, starting air, and combustion air intake and exhaust subsystems, and auxiliary systems' external carbon steel surfaces within the scope of license renewal.

In the NMP ALRA, the applicant also states, that for NMP Unit 2, this aging effect/mechanism is managed by NMP AMP B2.1.17, “Fire Water System Program,” NMP AMP B2.1.20, “One-Time Inspection Program,” NMP AMP B2.1.32, “Preventive Maintenance Program,” NMP AMP B2.1.33, “Systems Walkdown Program,” and NMP AMP B2.1.36, “Bolting Integrity Program,” for the applicable systems and components.

The applicant’s Preventive Maintenance, Systems Walkdown and Bolting Integrity Programs are reviewed by the NRR DE staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA. The project team reviewed the applicant’s Fire Water System and One-Time Inspection Programs and its evaluations are documented in Sections 2.17 and 2.19 of this audit and review report, respectively.

The project team reviewed the applicant’s further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.5 for further evaluation. Predicated on DE acceptance of the applicant’s Preventive Maintenance, Systems Walkdown and Bolting Integrity Programs, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3B.2.6 Loss of Material Due to General, Galvanic, Pitting, and Crevice Corrosion (NMP ALRA Section 3.3.2.C.6)

The project team reviewed NMP ALRA Section 3.3.2.C.6 against the criteria in SRP-LR Section 3.3.2.2.6.

The applicant states, in the NMP ALRA, that for loss of material due to general, galvanic, pitting, and crevice corrosion in the reactor recirculation pumps' oil collection system in fire protection, this item is not applicable since NMP does not have oil collection systems for its reactor recirculation pumps. The project team determined through discussions with the applicant's technical staff that for loss of material due to general, galvanic, pitting, and crevice corrosion in the reactor recirculation pumps' oil collection system in fire protection, this item is not applicable since NMP does not have oil collection systems for its reactor recirculation pumps.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.3B.2.7 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion and Biofouling (NMP ALRA Section 3.3.2.C.7)

The project team reviewed NMP ALRA Section 3.3.2.C.7 against the criteria in SRP-LR Section 3.3.2.2.7.

SRP-LR Section 3.3.2.2.7 states that loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling could occur in the internal surface of tanks in the diesel fuel oil system and due to general, pitting, and crevice corrosion and MIC in the tanks of the diesel fuel oil system in the emergency diesel generator system. The existing aging management program relies on the Fuel Oil Chemistry Program for monitoring and control of fuel oil contamination in accordance with the guidelines of ASTM Standards D4057, D1796, D2709 and D2276 to manage loss of material due to corrosion or biofouling. Corrosion or biofouling may occur at locations where contaminants accumulate. Verification of the effectiveness of the chemistry control program should be performed to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage corrosion/biofouling to verify the effectiveness of the program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

In NMP ALRA Section 3.3.2.C.7, the applicant addresses loss of material due to general, pitting, crevice, and MIC and biofouling for the internal surfaces of components in the diesel fuel oil system.

The applicant also states, in the NMP ALRA, that for NMP Unit 2, this aging effect/mechanism is managed by the combination of NMP AMP B2.1.18, “Fuel Oil Chemistry Program,” and NMP AMP B2.1.20, “One-Time Inspection Program.”

The project team reviewed the applicant’s Fuel Oil Chemistry and One-Time Inspection Programs and its evaluations are documented in Sections 2.18 and 2.19 of this audit and review report, respectively.

The project team reviewed the applicant’s further evaluation described above and concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.7 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.3B.2.8 Quality Assurance for Aging Management of Non-Safety-Related Components (NMP ALRA Section 3.3.2.C.8)

NMP ALRA Section 3.3.2.C.8 is reviewed by the NRR DIPM staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA.

3.3B.2.9 Crack Initiation and Growth Due to Stress Corrosion Cracking and Cyclic Loading (NMP ALRA Section 3.3.2.C.9)

The project team reviewed NMP ALRA Section 3.3.2.C.9 against the criteria in SRP-LR Section 3.3.2.2.9.

The applicant states, in the NMP ALRA, that since crack initiation and growth due to stress corrosion cracking and cyclic loading applies to PWRs only, this aging effect/mechanism is not applicable to NMP. The project team determined through discussions with the applicant’s technical staff that since this applies to PWRs only, it is not applicable to NMP.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.3B.2.10 Reduction of Neutron-Absorbing Capacity and Loss of Material Due to General Corrosion (NMP ALRA Section 3.3.2.C.10)

The project team reviewed NMP ALRA Section 3.3.2.C.10 against the criteria in SRP-LR Section 3.3.2.2.10.

SRP-LR Section 3.3.2.2.10 states that reduction of neutron-absorbing capacity and loss of material due to general corrosion could occur in the neutron-absorbing sheets of the spent fuel storage rack in the spent fuel storage. The GALL Report recommends further evaluation to ensure that these aging effects/mechanisms are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

The applicant states, in the NMP ALRA, that for the reduction of neutron-absorbing capacity and loss of material due to general corrosion in the neutron-absorbing (Boral or boron steel) sheets of the spent fuel storage racks, this aging effect/mechanism is not applicable since NMP identified no aging effects/mechanisms for these components. The project team determined through discussions with the applicant's technical staff that the reduction of neutron-absorbing capacity and loss of material due to general corrosion in the neutron-absorbing (Boral or boron steel) sheets of the spent fuel storage racks is not applicable at NMP since no aging effects/mechanisms were identified for these components.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.3B.2.11 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion (NMP ALRA Section 3.3.2.C.11)

The project team reviewed NMP ALRA Section 3.3.2.C.11 against the criteria in SRP-LR Section 3.3.2.2.11.

SRP-LR Section 3.3.2.2.11 states that loss of material due to general, pitting, and crevice corrosion and MIC could occur in the underground piping and fittings in the open-cycle cooling water system (service water system) and in the diesel fuel oil system. The Buried Piping and Tanks Inspection Program relies on industry practice, frequency of pipe excavation, and operating experience to manage the effects of loss of material from general, pitting, and crevice corrosion and MIC. The effectiveness of the applicant's Buried Piping and Tanks Inspection Program should be verified to evaluate an applicant's inspection frequency and operating experience with buried components, ensuring that loss of material is not occurring.

In NMP ALRA Section 3.3.2.C.11, the applicant addresses loss of material due to general, pitting, crevice, and microbiologically influenced corrosion for buried piping and fittings.

In the NMP ALRA, the applicant also states, that this aging effect/mechanism is managed by NMP AMP B2.1.22, "Buried Piping and Tanks Inspection Program," for NMP Unit 2 fire detection and protection systems. The project team reviewed the applicant's Buried Piping and Tanks Inspection Program and its evaluation is documented in Section 2.21 of this audit and review report.

During the audit and review, the project team asked the applicant to clarify its position relative to opportunistic inspections prior to the period of extended operation. In a letter dated December 1, 2005, the applicant states that the NMP ALRA will be revised to include the following in its Buried Piping and Tanks Inspection Program:

> Program activities will include visual inspections of external coatings and wrappings to detect damage and degradation. Prior to entering the period of

> extended operation, NMPNS will verify that there has been at least one opportunistic or focused inspection within the past ten years. Upon entering the period of extended operation, NMPNS will perform a focused inspection within ten years, unless an opportunistic inspection occurred within this ten year period. All credited inspections will be performed in areas with the highest likelihood of corrosion problems, and in areas with a history of corrosion problems.

Based on a review of the applicant's clarification of its visual inspection position and the applicant's further evaluation described above, the project team concludes that it meets the criteria in the SRP-LR.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.3.2.2.11 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

Conclusion

On the basis of its review, for component groups evaluated in the GALL Report for which the GALL Report recommends further evaluation, the project team determined that the applicant adequately addressed these issues. For these items, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4A NMP ALRA Unit 1 Section 3.4 - Aging Management of Steam and Power Conversion Systems

In NMP ALRA Section 3.4.2, the applicant provided the results of its AMRs for the steam and power conversion systems.

In NMP ALRA Tables 3.4.2.A-1 through 3.4.2.A-7, the applicant provided a summary of its AMR results for component types associated with the (1) condensate and condensate transfer system; (2) feedwater/high pressure coolant injection system; (3) main generator and auxiliary system; (4) main steam system; (5) condenser air removal and off-gas system; (6) main turbine and auxiliary system; and (7) moisture separator reheater steam system. The summary information for each component type included intended function; material; environment; aging effect/mechanism requiring management; AMPs; the GALL Report Volume 2 item; cross reference to NMP ALRA Table 3.4.1.A (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

For each component type in NMP ALRA Table 3.4.1.A, the applicant identified those component types that are managed in a manner consistent with the GALL Report, component types for which the GALL Report recommends further evaluation, and those AMRs that are not addressed in the GALL Report together with the method proposed for their aging management.

The project team conducted its audit and review in accordance with SRP-LR Section 3.4.3 and the NMP audit and review plan. The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report.

3.4A.1 Aging Management Review Results That Are Consistent with the GALL Report

For aging management evaluations that the applicant states are consistent with the GALL Report, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the NMP ALRA is acceptable.

The project team reviewed its assigned NMP ALRA line items to determine that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects/mechanisms have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects/mechanisms for the condensate and condensate transfer system, feedwater/high pressure coolant injection system, main generator and auxiliary system, main steam system, condenser air removal and off-gas system, main turbine and auxiliary system, and moisture separator reheater steam system components that are subject to an AMR.

The following subparagraphs identify differences, when compared to the GALL Report, that were identified by the project team during the audit and review.

3.4A.1.1 Loss of Material Due to Pitting and Crevice Corrosion

In the discussion section of NMP ALRA Table 3.4.1.A, Item 3.4.1.A-07, the applicant states that for main steam carbon steel piping and valve bodies in a treated water environment, the aging effect/mechanism of loss of material due to pitting and crevice corrosion will be managed by using NMP AMP B2.1.2, Water Chemistry Program." For small-bore piping and valves in a treated water environment, an additional program, NMP AMP B2.1.20, "One-Time Inspection Program," will be used.

During the audit and review, the project team questioned the applicant why the small-bore piping and its One-Time Inspection Program were not included in the AMP discussion for NMP ALRA Table 3.4.2.A-4. The applicant stated that the NMP Unit 1 main steam system has small-bore carbon steel drain line piping, fitting and valves. These components were not accurately reflected in NMP ALRA Table 3.4.2.A-4. In a letter dated December 1, 2005, the applicant states that it will correct this deficiency by revising NMP ALRA Table 3.4.2.A-4 to include the small-bore carbon steel piping, fittings and valves.

The project team reviewed the applicant's response and finds it consistent with the GALL Report and therefore acceptable.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.4A.1.2 Loss of Material due to General Corrosion; Crack Initiation and Growth due to Cyclic Loading and/or SCC

In reviewing NMP ALRA Tables 3.4.2.A-1 through 3.4.2.A-7, the project team noted that the applicant did not appear to list the AMR results for the extraction steam system. The GALL Report lists the components in the extraction steam system subject to an environment of steam with aging effects/mechanisms of wall thinning (due to FAC) and loss of material (due to general, pitting and crevice corrosion). For managing this component, material, environment and aging effect/mechanism combination, the GALL Report AMPs listed are GALL AMP XI.M17, "Flow-Accelerated Corrosion," and GALL AMP XI.M2, "Water Chemistry," and in some cases, augmented by GALL AMP XI.M32, "One-Time Inspection." During the audit and review, the project team asked the applicant to explain this difference. The applicant responded that the AMR results for the NMP Unit 1 extraction steam system are included as part of the feedwater system. However, the applicant acknowledged that in NMP ALRA Table 3.4.2.A-2 for the feedwater system, it did not specifically identify which piping, fittings and valves were applicable to the extraction steam system by denoting those line items with reference to items in GALL Report Chapter VIII, Table C.

In a letter dated December 1, 2005, the applicant states that to correct this difference, it will revise NMP ALRA Table 3.4.2.A-2 to specifically identify the components for the extraction steam system.

The project team reviewed the applicant's response and finds it consistent with the GALL Report and therefore acceptable.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.4A.1.3 Loss of Material Due to General (Carbon Steel Only), Pitting, and Crevice Corrosion, MIC, and Biofouling, Buildup of Deposit Due to Biofouling

In the NMP ALRA Table 3.4.1.A, Items 3.4.1.A-09 and 3.4.1.A-10, the applicant stated that these items are not applicable because "All other heat exchangers are of a different material (copper alloys or stainless steel) and do not have this aging effect/mechanism." However, both copper alloy and stainless steel are subjected to the aging effect of pitting and crevice corrosion. The staff issued RAI 3.4.1.A-1 requesting the applicant to clarify why both items are not applicable for NMP Unit 1.

Conclusion

The project team has evaluated the applicant's claim of consistency with the GALL Report. The project team also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects/mechanisms. On the basis of its review, the project team finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the project team finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4A.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL Report

For some line items assigned to the project team in NMP ALRA Tables 3.4.2.A-1 through 3.4.2.A-7, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in NMP ALRA Section 3.4.2.C against the criteria provided in SRP-LR Section 3.4.2.2. The project team's assessments of these evaluations are documented in this section. These assessments are applicable to each Table 2 line item in NMP ALRA Section 3.4.2 that includes a reference to the item in Table 1 for which further evaluation is recommended.

3.4A.2.1 Cumulative Fatigue Damage (NMP ALRA Section 3.4.2.C.1)

NMP ALRA Section 3.4.2.C.1 is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The TLAA is reviewed by the NRR DE staff. The evaluation of this TLAA will be addressed separately in Section 4 of the SER related to the NMP ALRA.

3.4A.2.2 Loss of Material Due to General, Pitting, and Crevice Corrosion (NMP ALRA Section 3.4.2.C.2)

The project team reviewed NMP ALRA Section 3.4.2.C.2 against the criteria in SRP-LR Section 3.4.2.2.2.

SRP-LR Section 3.4.2.2.2 states that the management of loss of material due to general, pitting, and crevice corrosion should be evaluated further for carbon steel piping and fittings, valve bodies and bonnets, pump casings, pump suction and discharge lines, tanks, tubesheets, channel heads, and shells except for main steam system components and for loss of material due to pitting and crevice corrosion for stainless steel tanks and heat exchanger/cooler tubes. The Water Chemistry Program relies on monitoring and control of water chemistry based on the guidelines in BWRVIP-29 (EPRI TR-103515), "BWR Water Chemistry Guidelines - Normal and Hydrogen Water Chemistry," to manage the effects of loss of material due to general, pitting, or crevice corrosion. However, corrosion may occur at locations of stagnant flow conditions. Therefore, the effectiveness of the applicant's Chemistry Control Program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material due to general, pitting, and crevice corrosion to verify the effectiveness of the applicant's Water Chemistry Program. A one-time inspection of select components and susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

In NMP ALRA Section 3.4.2.C.2, the applicant addresses loss of material due to general, pitting, and crevice corrosion for various carbon steel components.

In the NMP ALRA, the applicant also states, that for NMP Unit 1, this aging effect/mechanism is managed by the combination of NMP AMP B2.1.2, “Water Chemistry Control Program,” and NMP AMP B2.1.20, “One-Time Inspection Program,” for the applicable systems and components.

The project team reviewed the applicant’s Water Chemistry Control and One-Time Inspection Programs and its evaluations are documented in Sections 2.2 and 2.19 of this audit and review report, respectively.

The AMPs recommended by the GALL Report are GALL AMP XI.M2, “Water Chemistry” and GALL AMP XI.M32, “One-Time Inspection,” for management of this aging effect/mechanism. The applicant’s Water Chemistry Control Program mitigates the aging effects/mechanisms on component surfaces that are exposed to water as the process fluid; chemistry programs are used to control water chemistry for impurities (e.g., chloride and sulfate) that accelerate corrosion and that cause loss of material due to general, pitting, and crevice corrosion. This program relies on monitoring and control of water chemistry to keep peak levels of various contaminants below system-specific limits. The applicant’s One-Time Inspection Program is a new AMP; its scope includes activities verifying the effectiveness of the applicant’s Water Chemistry Control Program. Implementation of the applicant’s One-Time Inspection Program, in conjunction with its Water Chemistry Control Program, to manage the aging effect/mechanism provides added assurance that the aging effect/mechanism is not occurring at locations of stagnant or low flow; or that the aging effect/mechanism is progressing very slowly such that the component's intended function will be maintained during the period of extended operation. The project team finds that, based on the application of these two programs, the applicant has appropriately evaluated AMR results involving management of the loss of material due to general, pitting, and crevice corrosion for components in the steam and power conversion systems, as recommended in the GALL Report.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.4.2.2.2 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4A.2.3 Loss of Material Due to General, Pitting, and Crevice Corrosion, Microbiologically Influenced Corrosion and Biofouling (NMP ALRA Section 3.4.2.C.3)

The project team reviewed NMP ALRA Section 3.4.2.C.3 against the criteria in SRP-LR Section 3.4.2.2.3.

The applicant states, in the NMP ALRA, that for the loss of material due to general, pitting, and crevice corrosion, MIC and biofouling, this aging effect/mechanism is not applicable to NMP. This aging effect/mechanism applies to PWR systems only and is therefore not applicable to NMP. The project team determined through discussions with the applicant’s technical staff that the loss of material due to general, pitting, and crevice corrosion, microbiologically influenced corrosion and biofouling, applies to PWR systems only and is therefore not applicable to NMP Unit 1.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.4A.2.4 General Corrosion (NMP ALRA Section 3.4.2.C.4)

The project team reviewed NMP ALRA Section 3.4.2.C.4 against the criteria in SRP-LR Section 3.4.2.2.4.

SRP-LR Section 3.4.2.2.4 states that loss of material due to general corrosion could occur on the external surfaces of all carbon steel structures and components, including closure boltings, exposed to operating temperature less that 212EF. The GALL Report recommends further evaluation to ensure that this aging effect/mechanism is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

In NMP ALRA Section 3.4.2.C.4, the applicant addresses loss of material due to general corrosion on the external surfaces of all carbon steel structures and components, including closure bolting, exposed to operating temperatures less than 212EF.

In the NMP ALRA, the applicant also states, that for NMP Unit 1, this aging effect/mechanism is managed by NMP AMP B2.1.33, “Systems Walkdown Program.” The applicant’s Systems Walkdown Program is reviewed by the NRR DE staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA.

The project team finds this program acceptable for managing loss of material due to general corrosion since visual inspection of external surfaces is performed during various systems walkdown. In addition, the NMP plant-specific operating experience also indicates that this program is effective in identifying aging effects/mechanisms that have been observed in the applicant’s plant. Therefore, the project team concludes that the applicant has appropriately evaluated AMR results involving management of the loss of material due to general corrosion for components in the steam and power conversion systems, as recommended in the GALL Report.

The project team finds that, based on the program identified above, the applicant has met the criteria of SRP-LR Section 3.4.2.2.4 for further evaluation. Predicated on DE acceptance of the applicant’s Systems Walkdown Program, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4A.2.5 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion (NMP ALRA Section 3.4.2.C.5)

3.4A.2.5.1 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion (NMP ALRA Section 3.4.2.C.5)

The project team reviewed NMP ALRA Section 3.4.2.C.5 against the criteria in SRP-LR Section 3.4.2.2.5.

The applicant states, in the NMP ALRA, that for the loss of material due to general, pitting, crevice, and MIC, this aging effect/mechanism is not applicable to NMP Unit 1. This discussion applies to PWR systems only, and is therefore not applicable to NMP Unit 1. The project team determined through discussions with the applicant's technical staff that for loss of material due to general, pitting, crevice, and MIC, this aging effect/mechanism is not applicable to NMP Unit 1 since it applies to PWR systems only.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.4A.2.5.2 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion (NMP ALRA Section 3.4.2.C.5)

The project team reviewed NMP ALRA Section 3.4.2.C.5 against the criteria in SRP-LR Section 3.4.2.2.5.

The applicant states, in the NMP ALRA, that for the loss of material due to general, pitting, crevice, and MIC, this aging effect/mechanism is not applicable to NMP Unit 1. This discussion applies to PWR systems only, and is therefore not applicable to NMP Unit 1. The project team determined through discussions with the applicant's technical staff that for loss of material due to general, pitting, crevice, and MIC, this aging effect/mechanism is not applicable to NMP Unit 1 since it applies to PWR systems only.

On the basis that NMP is a BWR, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.4A.2.6 Quality Assurance for Aging Management of Non-Safety-Related Components (NMP ALRA Section 3.4.2.C.6)

NMP ALRA Section 3.4.2.C.6 is reviewed by the NRR DIPM staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA.

Conclusion

On the basis of its review, for component groups evaluated in the GALL Report for which the GALL Report recommends further evaluation, the project team determined that the applicant adequately addressed these issues. For these items, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4B NMP ALRA Unit 2 Section 3.4 - Aging Management of Steam and Power Conversion Systems

In NMP ALRA Section 3.4.2.C, the applicant provided the results of its AMRs for the steam and power conversion systems.

In NMP ALRA Tables 3.4.2.B-1 through 3.4.2.B-7, the applicant provided a summary of the AMR results for component types associated with the (1) main condenser air removal system; (2) condensate system; (3) feedwater system; (4) main steam system; (5) moisture separator and reheater system; (6) extraction steam and feedwater drain system; and (7) turbine main system. The summary information for each component type included intended function; material; environment; aging effect/mechanism requiring management; AMPs; the GALL Report Volume 2 item; cross reference to NMP ALRA Table 3.4.1.B (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

For each component type in NMP ALRA Table 3.4.1.B, the applicant identified those component types that are managed in a manner consistent with the GALL Report, component types for which the GALL Report recommends further evaluation, and those AMRs that are not addressed in the GALL Report together with the method proposed for their aging management.

The project team conducted its audit and review in accordance with SRP-LR Section 3.4.3 and the NMP audit and review plan. The project team interviewed the applicant’s technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report.

3.4B.1 Aging Management Review Results That Are Consistent with the GALL Report

For aging management evaluations that the applicant states are consistent with the GALL Report, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the NMP ALRA is acceptable.

The project team reviewed its assigned NMP ALRA line items to determine that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects/mechanisms have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects/mechanisms for the main condenser air removal system, condensate system, feedwater system, main steam system, moisture separator and reheater system, extraction steam and feedwater drain system, and turbine main system components that are subject to an AMR.

The following subparagraphs identify differences, when compared to the GALL Report, that were identified by the project team during the audit and review.

3.4B.1.1 Loss of Material Due to Pitting and Crevice Corrosion

In the discussion section of NMP ALRA Table 3.4.1.B, Item 3.4.1.B-07, the applicant states that for main steam carbon steel piping and valve bodies in a treated water environment, the aging effect/mechanism of loss of material due to pitting and crevice corrosion will be managed by using NMP AMP B2.1.2, "Water Chemistry Program." For small-bore piping and valves in a treated water environment, an additional AMP, NMP AMP B2.1.20, "One-Time Inspection Program," will be used.

During the audit and review, the project team questioned the applicant why the small-bore piping and One-Time Inspection Program were not included in the AMP discussion for NMP ALRA Table 3.4.2.B-4. The applicant stated that the NMP Unit 2 main steam system has small-bore carbon steel drain line piping, fitting and valves. These components were not accurately reflected in NMP ALRA Table 3.4.2.B-4. In a letter dated December 1, 2005, the applicant states that it will correct this deficiency by revising NMP ALRA Table 3.4.2.B-4 to include the small-bore carbon steel piping, fittings and valves.

The project team reviewed the applicant's response and finds it consistent with the GALL Report and therefore acceptable.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

Conclusion

The project team has evaluated the applicant's claim of consistency with the GALL Report. The project team also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects/mechanisms. On the basis of its review, the project team finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the project team finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4B.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL Report

For some line items assigned to the project team in NMP ALRA Tables 3.4.2.B-1 through 3.4.2.B-7, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in NMP ALRA Section 3.4.2.C against the criteria provided in SRP-LR Section 3.4.2.2. The project team's assessments of these evaluations are documented in this section. These assessments are applicable to each Table 2 line item in NMP ALRA Section 3.4.2 that includes a reference to the item in Table 1 for which further evaluation is recommended.

3.4B.2.1 Cumulative Fatigue Damage (NMP ALRA Section 3.4.2.C.1)

NMP ALRA Section 3.4.2.C.1 is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The TLAA is reviewed by the NRR DE staff. The evaluation of this TLAA will be addressed separately in Section 4 of the SER related to the NMP ALRA.

3.4B.2.2 Loss of Material Due to General, Pitting, and Crevice Corrosion (NMP ALRA Section 3.4.2.C.2)

The project team reviewed NMP ALRA Section 3.4.2.C.2 against the criteria in SRP-LR Section 3.4.2.2.2.

SRP-LR Section 3.4.2.2.2 states that the management of loss of material due to general, pitting, and crevice corrosion should be evaluated further for carbon steel piping and fittings, valve bodies and bonnets, pump casings, pump suction and discharge lines, tanks, tubesheets, channel heads, and shells except for main steam system components and for loss of material due to pitting and crevice corrosion for stainless steel tanks and heat exchanger/cooler tubes. The Water Chemistry Program relies on monitoring and control of water chemistry based on the guidelines in BWRVIP-29 (EPRI TR-103515), “BWR Water Chemistry Guidelines - Normal and Hydrogen Water Chemistry,” to manage the effects of loss of material due to general, pitting, or crevice corrosion. However, corrosion may occur at locations of stagnant flow conditions. Therefore, the effectiveness of the applicant’s Chemistry Control Program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material due to general, pitting, and crevice corrosion to verify the effectiveness of the applicant’s Water Chemistry Program. A one-time inspection of select components and susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component’s intended function will be maintained during the period of extended operation.

In NMP ALRA Section 3.4.2.C.2, the applicant addresses the management of loss of material due to general, pitting, and crevice corrosion for various carbon steel components.

In the NMP ALRA, the applicant also states, that for NMP Unit 2, this aging effect/mechanism is managed by the combination of NMP AMP B2.1.2, “Water Chemistry Control Program,” and NMP AMP B2.1.20, “One-Time Inspection Program,” for the applicable systems and components.

The project team reviewed the applicant’s Water Chemistry Control and One-Time Inspection Programs and its evaluations are documented in Sections 2.2 and 2.19 of this audit and review report, respectively.

The AMPs recommended by the GALL Report are GALL AMP XI.M2, “Water Chemistry” and GALL AMP XI.M32, “One-Time Inspection,” for management of this aging effect/mechanism. The applicant’s Water Chemistry Control Program mitigates the aging effects/mechanisms on component surfaces that are exposed to water as the process fluid; chemistry programs are used to control water chemistry for impurities (e.g., chloride and sulfate) that accelerate corrosion and that cause loss of material due to general, pitting, and crevice corrosion. This program relies on monitoring and control of water chemistry to keep peak levels of various contaminants below system-specific limits. The applicant’s One-Time Inspection Program is a new AMP; its scope includes activities verifying the effectiveness of the applicant's Water Chemistry Control Program. Implementation of the applicant's One-Time Inspection Program, in conjunction with its Water Chemistry Control Program, to manage the aging effect/mechanism provides added assurance that the aging effect/mechanism is not occurring at locations of stagnant or low flow; or that the aging effect/mechanism is progressing very slowly such that the component's intended function will be maintained during the period of extended operation. The project team finds that, based on the application of these two programs, the applicant has appropriately evaluated AMR results involving management of the loss of material due to general, pitting, and crevice corrosion for components in the steam and power conversion systems, as recommended in the GALL Report.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.4.2.2.2 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4B.2.3 Loss of Material Due to General, Pitting, and Crevice Corrosion, Microbiologically Influenced Corrosion and Biofouling (NMP ALRA Section 3.4.2.C.3)

The project team reviewed NMP ALRA Section 3.4.2.C.3 against the criteria in SRP-LR Section 3.4.2.2.3.

The applicant states, in the NMP ALRA, that for the loss of material due to general, pitting, and crevice corrosion, MIC and biofouling, this aging effect/mechanism is not applicable to NMP. This aging effect/mechanism applies to PWR systems only and is therefore not applicable to NMP. The project team determined through discussions with the applicant's technical staff that the loss of material due to general, pitting, and crevice corrosion, MIC and biofouling, applies to PWR systems only and is therefore not applicable to NMP Unit 2.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.4B.2.4 General Corrosion (NMP ALRA Section 3.4.2.C.4)

The project team reviewed NMP ALRA Section 3.4.2.C.4 against the criteria in SRP-LR Section 3.4.2.2.4.

SRP-LR Section 3.4.2.2.4 states that loss of material due to general corrosion could occur on the external surfaces of all carbon steel structures and components, including closure boltings, exposed to operating temperature less that 212EF. The GALL Report recommends further evaluation to ensure that this aging effect/mechanism is adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.

In NMP ALRA Section 3.4.2.C.4, the applicant addresses loss of material due to general corrosion on the external surfaces of all carbon steel structures and components, including closure bolting, exposed to operating temperatures less than 212EF.

In the NMP ALRA, the applicant also states, that for NMP Unit 2, this aging effect/mechanism is managed by NMP AMP B2.1.33, “Systems Walkdown Program.” The applicant’s Systems Walkdown Program is reviewed by the NRR DE staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA.

The project team finds the applicant’s Systems Walkdown Program acceptable for managing loss of material due to general corrosion since visual inspection of external surfaces is performed during various systems walkdown. In addition, the NMP plant-specific operating experience also indicates that this program is effective in identifying aging effects/mechanisms that have been observed in the applicant's plant. Therefore, the project team concludes that the applicant has appropriately evaluated AMR results involving management of the loss of material due to general corrosion for components in the steam and power conversion systems, as recommended in the GALL Report.

The project team finds that, based on the program identified above, the applicant has met the criteria of SRP-LR Section 3.4.2.2.4 for further evaluation. Predicated on the DE acceptance of the applicant’s Systems Walkdown Program, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4B.2.5 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion (NMP ALRA Section 3.4.2.C.5)

3.4B.2.5.1 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion (NMP ALRA Section 3.4.2.C.5)

The project team reviewed NMP ALRA Section 3.4.2.C.5 against the criteria in SRP-LR Section 3.4.2.2.5.

The applicant states, in the NMP ALRA, that for the loss of material due to general, pitting, crevice, and MIC, this aging effect/mechanism is not applicable to NMP Unit 2. This discussion applies to PWR systems only, and is therefore not applicable to NMP Unit 2. The project team determined through discussions with the applicant’s technical staff that for loss of material due to general, pitting, crevice, and MIC, this aging effect/mechanism is not applicable to NMP Unit 2 since it applies to PWR systems only.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.4B.2.5.2 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion (NMP ALRA Section 3.4.2.C.5)

The project team reviewed NMP ALRA Section 3.4.2.C.5 against the criteria in SRP-LR Section 3.4.2.2.5.

The applicant states, in the NMP ALRA, that for the loss of material due to general, pitting, crevice, and MIC, this aging effect/mechanism is not applicable to NMP Unit 2. This discussion applies to PWR systems only, and is therefore not applicable to NMP Unit 2. The project team determined through discussions with the applicant's technical staff that for loss of material due to general, pitting, crevice, and MIC, this aging effect/mechanism is not applicable to NMP Unit 2 since it applies to PWR systems only.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.4B.2.6 Quality Assurance for Aging Management of Non-Safety-Related Components (NMP ALRA Section 3.4.2.C.6)

NMP ALRA Section 3.4.2.C.6 is reviewed by the NRR DIPM staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA.

Conclusion

On the basis of its review, for component groups evaluated in the GALL Report for which the GALL Report recommends further evaluation, the project team determined that the applicant adequately addressed these issues. For these items, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5A NMP ALRA Unit 1 Section 3.5 - Aging Management of Structures and Component Supports

In NMP ALRA Section 3.5.2, the applicant provided the results of its AMRs for the structures and component supports.

In NMP ALRA Tables 3.5.2.A-1 through 3.5.2.A-11, the applicant provided a summary of the AMR results for component types associated with the (1) primary containment structure; (2) reactor building; (3) essential yard structures; (4) fuel handling system; (5) material handling system; (6) offgas building; (7) radwaste solidification and storage building; (8) screen and pump house building; (9) turbine building; (10) vent stack; and (11) waste disposal building. The summary information for each component type included intended function; material; environment; aging effect/mechanism requiring management; AMPs; the GALL Report Volume 2 item; cross reference to NMP ALRA Table 3.5.1.A (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

For each component type in NMP ALRA Table 3.5.1.A, the applicant identified those component types that are managed in a manner consistent with the GALL Report, component types for which the GALL Report recommends further evaluation, and those AMRs that are not addressed in the GALL Report together with the method proposed for their aging management.

The project team conducted its audit and review in accordance with SRP-LR Section 3.5.3 and the NMP audit and review plan. The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report.

3.5A.1 Aging Management Review Results That Are Consistent with the GALL Report

For aging management evaluations that the applicant states are consistent with the GALL Report, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the NMP ALRA is acceptable.

The project team reviewed its assigned NMP ALRA line items to determine that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects/mechanisms have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects/mechanisms for the primary containment structure, reactor building, essential yard structures, fuel handling system, material handling system, offgas building, radwaste solidification and storage building, screen and pump house building, turbine building, vent stack, and waste disposal building components that are subject to an AMR.

The following subparagraphs identify differences, when compared to the GALL Report, that were identified by the project team during the audit and review.

3.5A.1.1 Loss of Leak Tightness in Closed Position Due to Mechanical Wear of Locks, Hinges and Closure Mechanisms

During the audit and review, the project team noted that in NMP ALRA Table 3.5.2.A-1 (Page 3.5-64) for component type equipment hatches (including stabilizers) and aging effect/mechanisms loss of leak tightness, the Table 1 line item shown is Item 3.5.1.B-05. During the audit and review, the project team asked the applicant to explain why a NMP Unit 2 line item is shown with a NMP Unit 1 component type.

In a letter dated December 1, 2005, the applicant states that the occurrence is an error. For NMP ALRA Table 3.5.2.A-1 (Page 3.5-64) for component type equipment hatches (including stabilizers) for aging effect/mechanism loss of leak tightness, the Table 1 reference is changed from Item 3.5.1.B-05 to Item 3.5.1.A-05.

The project team reviewed the applicant's response and finds the correction of the reference to NMP ALRA Table 3.5.1.A, Item 3.5.1.A-05 acceptable because it is the proper Unit 1 line item.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.5A.1.2 Crack Initiation and Growth Due to SCC; Loss of Material Due to Crevice Corrosion

During the audit and review, the project team noted that in NMP ALRA Table 3.5.2.A-2 (Page 3.5-71) for component type liners and aging effect/mechanism cracking, the GALL Report Volume 2 line item shown is Item III.A5.2-b with NMP ALRA Table 3.5.1.A, Item 3.5.1.A-23. The Note D shown states that the component is different from the GALL Report line item. During the audit and review, the project team asked the applicant to explain how this AMR line item component is different from the GALL Report when GALL Report Item III.A5.2-b is also for the component, liners.

In a letter dated December 1, 2005, the applicant states that the note referenced should be Note B instead of Note D. The reference would be to Note A, except the AMP shown takes exceptions to the GALL Report AMP. The applicant further states that NMP ALRA Table 3.5.2.A-2 is revised to change Note D to Note B for all AMR line item component liners with the aging effect/mechanism of cracking.

The project team reviewed the applicant's response and finds the correction of Note D to Note B acceptable because the proper note is assigned to this AMR line item.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.5A.1.3 Aging of Component Supports

During the audit and review, the project team noted that in NMP ALRA Table 3.5.2.A-1 (Page 3.5-64) for component type expansion/grouted anchors and aging effect/mechanism loss of anchor capacity, the GALL Report Volume 2 line items shown are Items III.B1.1.4-a and III.B1.2.3-a with NMP ALRA Table 3.5.1.A, Item 3.5.1.A-29. The environment shown is concrete and the note states that it is consistent with the GALL Report. During the audit, the project team asked the applicant to explain how this AMR line item is consistent with the GALL Report when the two GALL Report line items have a component type of concrete surrounding anchor bolts, a material of concrete, an environment of inside containment, and an aging effect/mechanism of reduction in anchor capacity. The logic of this NMP AMR line item is not consistent with the GALL Report. This also applies to NMP ALRA Table 3.5.2.A-2 (Page 3.5-70); NMP ALRA Table 3.5.2.A-6 (Page 3.5-76); NMP ALRA Table 3.5.2.A-8 (Page 3.5-80); and NMP ALRA Table 3.5.2.A-9 (Page 3.5-83) for component type expansion/grouted anchors. It should be noted that these four additional AMR line items are shown in the NMP ALRA to be associated with the GALL Report Volume 2 Item III.B1.2.3-a only.

In a letter dated December 1, 2005, the applicant states that it will make the NMP ALRA consistent with the GALL Report for all of its expansion/grouted anchor AMR line items listed above. The NMP ALRA line item for carbon steel in concrete is revised. In its place, the component type is changed to concrete surrounding anchor bolts, the carbon steel is replaced with concrete (new line with the current line that starts with concrete), the environment of concrete is replaced with air and the rest of the lines will remain as they are currently displayed.

NMP used the aging effect requiring management (AERM) of loss of anchor capacity instead of reduction in anchor capacity as per the GALL Report, however, it is intended that these terms have exactly the same meaning.

The project team reviewed the applicant’s response and finds that after revision of the applicant’s AMR line items as described above, these line items for the component expansion/grouted anchor (now component type, concrete surrounding anchor bolts, after revision) are consistent with the GALL Report and therefore acceptable.

During the audit and review, the project team noted that in NMP ALRA Table 3.5.2.A-11 (Page 3.5-85) for component type expansion/grouted anchors and aging effect/mechanism loss of anchor capacity, the GALL Report Volume 2 line item shown is Item III.B1.2.3-a with NMP ALRA Table 3.5.1.A, Item 3.5.1.A-19. The environment shown is concrete and the note states that it is consistent with the GALL Report. During the audit and review, the project team asked the applicant to explain how this AMR line item is consistent with the GALL Report when the GALL Report line item has a component type of concrete surrounding anchor bolts, a material of concrete, an environment of inside or outside containment and an aging effect/mechanism of reduction in anchor capacity. The logic of this NMP AMR line item is not consistent with the GALL Report. Also the applicant was asked to explain why the NMP ALRA Table 3.5.1.A line item shown is Item 3.5.1.A-19 instead of Item 3.5.1.A-29.

In a letter dated December 1, 2005, the applicant states that it will make the NMP ALRA consistent with the GALL Report for the expansion/grouted anchor AMR line item listed above. The NMP ALRA current line for carbon steel in concrete is revised. In its place, the component type is changed to concrete surrounding anchor bolts, the material of carbon steel is replaced with concrete (new line with the current line that starts with concrete), the environment of concrete is replaced with air and the rest of the line will remain as it is currently displayed. NMP used the AERM of loss of anchor capacity instead of reduction in anchor capacity per the GALL Report, however, it is intended that these terms have exactly the same meaning. The NMP ALRA Table 3.5.1.A, Item 3.5.1.A-19 listed is an error and is revised to NMP ALRA Table 3.5.1.A, Item 3.5.1.A-29.

The project team reviewed the applicant’s response and finds that after revision of the applicant’s AMR line item as described above, this line item for the component expansion/grouted anchor (now component type, concrete surrounding anchor bolts, after revision) is consistent with the GALL Report and therefore acceptable. The project team also finds the correction of the reference to NMP ALRA Table 3.5.1.A, Item 3.5.1.A-29 appropriate.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

Conclusion

The project team has evaluated the applicant's claim of consistency with the GALL Report. The project team also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects/mechanisms. On the basis of its review, the project team finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the project team finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5A.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL Report

For some line items assigned to the project team in NMP ALRA Tables 3.5.2.A-1 through 3.5.2.A-11, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in NMP ALRA Section 3.5.2.D against the criteria provided in SRP-LR Section 3.5.2.2. The project team's assessments of these evaluations are documented in this section. These assessments are applicable to each Table 2 line item in NMP ALRA Section 3.5.2 that includes a reference to the item in Table 1 for which further evaluation is recommended.

3.5A.2.1 PWR and BWR Containments (NMP ALRA Section 3.5.2.C.1)

3.5A.2.1.1 Aging of Inaccessible Concrete Areas (NMP ALRA Section 3.5.2.C.1.1)

The project team reviewed NMP ALRA Section 3.5.2.C.1.1 against the criteria in SRP-LR Section 3.5.2.2.1.1.

The applicant states, in the NMP ALRA, that for aging of inaccessible concrete areas in BWR containments, this aging effect/mechanism is not applicable to NMP Unit 1. NMP Unit 1 is a BWR with a Mark I containment, therefore, this aging effect/mechanism is not applicable to NMP Unit 1. The project team determined through discussions with the applicant's technical staff that the aging of inaccessible concrete areas in BWR containments is not applicable to NMP Unit 1 since NMP Unit 1 is a BWR with a Mark I containment.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP Unit 1.

3.5A.2.1.2 Cracking, Distortion and Increase in Component Stress Level Due to Settlement; Reduction of Foundation Strength Due to Erosion of Porous Concrete Subfoundation If Not Covered by Structures Monitoring Program (NMP ALRA Section 3.5.2.C.1.2)

The project team reviewed NMP ALRA Section 3.5.2.C.1.2 against the criteria in SRP-LR Section 3.5.2.2.1.2.

The applicant states, in the NMP ALRA, that for the cracking, distortion, and increase in component stress level due to settlement; and reduction of foundation strength due to erosion of porous concrete subfoundations in BWR containments, this aging effect/mechanism is not applicable to NMP Unit 1. For NMP Unit 1, this subsection does not apply since NMP Unit 1 is a BWR with a Mark I containment. The project team determined through discussions with the applicant's technical staff that this aging effect/mechanism does not apply because NMP Unit 1 is a BWR with a Mark I containment.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP Unit 1.

3.5A.2.1.3 Reduction of Strength and Modulus of Concrete Structures Due to Elevated Temperature (NMP ALRA Section 3.5.2.C.1.3)

The project team reviewed NMP ALRA Section 3.5.2.C.1.3 against the criteria in SRP-LR Section 3.5.2.2.1.3.

The applicant states, in the NMP ALRA, that for the reduction of strength and modulus of concrete structures due to elevated temperature in BWR containments, this aging effect/mechanism is not applicable to NMP Unit 1. The project team determined through discussions with the applicant's technical staff that this aging effect/mechanism is not applicable to NMP Unit 1 because NMP Unit 1 is a BWR with a Mark I containment.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP Unit 1.

3.5A.2.1.4 Loss of Material Due to Corrosion in Inaccessible Areas of Steel Containment Shell or Liner Plate (NMP ALRA Section 3.5.2.C.1.4)

The project team reviewed NMP ALRA Section 3.5.2.C.1.4 against the criteria in SRP-LR Section 3.5.2.2.1.4.

SRP-LR Section 3.5.2.2.1.4 states that loss of material due to corrosion could occur in inaccessible areas of the steel containment shell or the steel liner plate for all types of BWR containments. The GALL Report recommends further evaluation of plant-specific programs to manage this aging effect/mechanism for inaccessible areas if specific conditions defined in the GALL Report cannot be satisfied.

In NMP ALRA Section 3.5.2.C.1.4, the applicant addresses loss of material due to corrosion in inaccessible areas of steel containment shell or liner plate in BWR containments.

For NMP Unit 1, NMP AMP B2.1.23, "ASME Section XI Inservice Inspection (IWE) Program," is credited for managing aging effects/mechanisms due to corrosion of accessible primary containment structure carbon steel components comprising the containment pressure boundary. Inaccessible areas are compared against accessible areas with similar environments. If warranted, additional inspections are performed.

In the NMP ALRA, the applicant also states, that NMP Unit 1 also credits NMP AMP B2.1.2, "Water Chemistry Control Program" and NMP AMP B3.3, "Torus Corrosion Monitoring

Program," to manage aging effects/mechanisms due to corrosion of primary containment structure carbon steel components in demineralized untreated water.

The applicant's Torus Corrosion Monitoring Program is reviewed by the NRR DE staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA. The project team reviewed the applicant's ASME Section XI Inservice Inspection (IWE) and Water Chemistry Control Programs and its evaluations are documented in Sections 2.22 and 2.2 of this audit and review report, respectively.

The project team notes, as stated above in SRP-LR Section 3.5.2.2.1.4, that the GALL Report recommends further evaluation of plant-specific programs to manage this aging effect/mechanism for inaccessible areas if specific conditions defined in the GALL Report cannot be satisfied.

GALL Report Item B1.1.1-a (Page II B1-3) states that for inaccessible areas (embedded containment steel shell or liner), loss of material due to corrosion is not significant if the following four specific conditions are satisfied:

1. Concrete meeting the requirements of ACI 318 or 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner.

2. The concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner.

3. The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with IWE requirements.

4. Borated water spills and water ponding on the containment concrete floor are not common and when detected are cleaned up in a timely manner.

The GALL Report states that if any of the four conditions cannot be satisfied, then a plant-specific AMP for corrosion is recommended. During the initial audit and review, the project team asked the applicant to provide an explanation for how each of the four conditions are satisfied at NMP Unit 1. The applicant addressed the four conditions as follows:

1. NMP Unit 1 was designed and constructed with equivalent codes as specified in the GALL Report.

2. The concrete is monitored in accordance with the applicant's ASME Section XI Inservice Inspection (IWE) and Structures Monitoring Programs.

3. This condition is not applicable to the NMP design.

4. This condition is not applicable to a BWR design.

On the basis of its audit and review, the project team finds that all of the conditions identified in the GALL Report are satisfied. The applicant states that the NMP Unit 1 containment was designed and constructed with codes equivalent to those specified in the GALL Report. Accessible concrete of the containment structure is monitored for penetrating cracks under the applicant's ASME Section XI Inservice Inspection (IWE) and Structures Monitoring Programs. Operating experience demonstrates that the aging effect/mechanism of loss of material due to corrosion has not been significant for the NMP Unit 1 steel containment shell. The project team finds that no additional plant-specific AMP is required to manage inaccessible areas of the steel containment shell.

The project team finds that, based on the programs identified above and the satisfaction of specific GALL Report conditions, the applicant has met the criteria of SRP-LR Section 3.5.2.2.1.4 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5A.2.1.5 Loss of Prestress Due to Relaxation, Shrinkage, Creep and Elevated Temperature (NMP ALRA Section 3.5.2.C.1.5)

The project team reviewed NMP ALRA Section 3.5.2.C.1.5 against the criteria in SRP-LR Section 3.5.2.2.1.5.

The applicant states, in the NMP ALRA, that for loss of prestress due to relaxation, shrinkage, creep and elevated temperature in BWR containments, this aging effect/mechanism is not applicable to NMP Unit 1. The project team determined through discussions with the technical staff that because NMP Unit 1 is a BWR with a Mark I containment, this aging effect/mechanism does not apply to NMP Unit 1.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP Unit 1.

3.5A.2.1.6 Cumulative Fatigue Damage (NMP ALRA Section 3.5.2.C.1.6)

NMP ALRA Section 3.5.2.C.1.6 is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The TLAA is reviewed by the NRR DE staff. The evaluation of this TLAA will be addressed separately in Section 4 of the SER related to the NMP ALRA.

3.5A.2.1.7 Cracking Due to Cyclic Loading and SCC (NMP ALRA Section 3.5.2.C.1.7)

The project team reviewed NMP ALRA Section 3.5.2.C.1.7 against the criteria in SRP-LR Section 3.5.2.2.1.7.

SRP-LR Section 3.5.2.2.1.7 states that cracking of containment penetrations (including penetration sleeves, penetration bellows, and dissimilar metal welds) due to cyclic loading or SCC could occur in all types of PWR and BWR containments. Cracking could also occur in vent line bellows, vent headers and downcomers due to SCC for BWR containments. A visual VT-3 examination would not detect such cracks. The GALL Report recommends further evaluation of the inspection methods implemented to detect these aging effects/mechanisms.

In NMP ALRA Section 3.5.2.C.1.7, the applicant addresses cracking due to cyclic loading and SCC in BWR containments.

In the NMP ALRA, the applicant also states, that for NMP Unit 1, NMP AMP B2.1.23, "ASME Section XI Inservice Inspection (Subsection IWE) Program," and NMP AMP B2.1.26, "10 CFR 50 Appendix J Program," are credited for managing cracking due to cyclic loading and SCC of primary containment structure steel components. In addition, an augmented VT-1 visual examination will be performed on containment bellows using enhanced techniques qualified for detecting SCC.

The project team reviewed the applicant's ASME Section XI Inservice Inspection (Subsection IWE) and 10 CFR 50 Appendix J Programs and its evaluations are documented in Sections 2.22 and 2.25 of this audit and review report, respectively.

Based on the applicant's further evaluation as recommended by the GALL Report for detecting cracking due to SCC, the project team finds that the applicant has elected to perform augmented VT-1 visual examinations on containment bellows using enhanced techniques qualified for detecting SCC. The project team finds this consistent with the GALL Report and therefore acceptable.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.5.2.2.1.7 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5A.2.2 Class I Structures (NMP ALRA Section 3.5.2.C.2)

3.5A.2.2.1 Aging of Structures Not Covered By Structures Monitoring Program (NMP ALRA Section 3.5.2.C.2.1)

The project team reviewed NMP ALRA Section 3.5.2.C.2.1 against the criteria in SRP-LR Section 3.5.2.2.2.1.

SRP-LR Section 3.5.2.2.2.1 states that the GALL Report recommends further evaluation of certain structure/aging effect combinations if they are not covered by the applicant's Structures Monitoring Program. This includes (1) scaling, cracking, and spalling due to repeated freeze-thaw for Groups 1-3, 5, 7-9 structures; (2) scaling, cracking, spalling and increase in porosity and permeability due to leaching of calcium hydroxide and aggressive chemical attack for Groups 1-5, 7-9 structures; (3) expansion and cracking due to reaction with aggregates for Groups 1-5, 7-9 structures; (4) cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel for Groups 1-5, 7-9 structures; (5) cracks, distortion, and increase in component stress level due to settlement for Groups 1-3, 5, 7-9 structures; (6) reduction of foundation strength due to erosion of porous concrete subfoundation for Groups 1-3, 5-9 structures; (7) loss of material due to corrosion of structural steel components for Groups 1-5, 7-8 structures; (8) loss of strength and modulus of concrete structures due to elevated temperatures for Groups 1-5; and (9) crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liner for Groups 7 and 8 structures. Further evaluation is necessary only for structure/aging effect combinations not covered by the applicant's Structures Monitoring Program.

SRP-LR Section 3.5.2.2.2.1 further states that technical details of the aging management issue are presented in Subsection 3.5.2.2.1.2 for Items (5) and (6) and Subsection 3.5.2.2.1.3 for Item (8).

In NMP ALRA Section 3.5.2.C.2.1, the applicant addresses the aging of all Class I structures which are covered by NMP AMP B2.1.28, "Structures Monitoring Program," and any Class I structures not covered by its Structures Monitoring Program.

In the NMP ALRA, the applicant also states, that there are no Group 6 structures (water control structures) at NMP Unit 1.

In addition, the applicant states in the NMP ALRA, that aging management of components in accessible areas of Class I structures will be performed through general visual inspections of its Structures Monitoring Program. Aging management is performed for the following aging effect/mechanisms: freeze-thaw, leaching of calcium hydroxide, aggressive chemical attack, reaction with aggregates, corrosion of embedded steel, and corrosion of structural steel.

Further, the applicant states in the NMP ALRA, that for NMP Unit 1, cracking, distortion, and an increase in component stress level due to settlement for Group 1-3, 5, 7-9 structures is not significant. Class I structures are founded on impervious rock. Although evaluated as not significant, the applicant credits its Structures Monitoring Program to monitor for settlement. NMP Unit 1 does not utilize a dewatering system.

The applicant also states, in the NMP ALRA, that for NMP Unit 1, reduction of foundation strength due to erosion of porous concrete subfoundation for Group 1-3, 5, 7-9 structures is not applicable. Porous concrete is not utilized in the construction of Class I structures.

In the NMP ALRA, the applicant states, that for NMP Unit 1, loss of material due to corrosion of structural steel components for Group 1-5, 7-8 structures is managed by its Structures Monitoring Program. Although NMP Unit 1 vent stack steel components are not identified in the GALL Report, these components are also managed using the applicant's Structures Monitoring Program. Additionally, the applicant credits NMP AMP B2.1.23, "ASME Section XI Inservice Inspection (IWE) Program," in lieu of its Structures Monitoring Program to manage loss of material due to corrosion of high-strength structural fasteners in demineralized untreated water.

The project team reviewed the applicant's Structures Monitoring and ASME Section XI Inservice Inspection (IWE) Programs and its evaluations are documented in Sections 2.27 and 2.22 of this audit and review report, respectively.

In addition, the applicant states in the NMP ALRA, that for NMP Unit 1, loss of strength and modulus of concrete structures due to elevated temperatures for Group 1-5 structures is not significant. In Class I structures, general area temperatures do not exceed 150EF and local area temperatures do not exceed 200EF. These temperatures are not sufficient to result in this aging effect/mechanism for the applicable components.

Furthermore, the applicant states in the NMP ALRA, that for NMP Unit 1, crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liners for Group 7 and 8 structures is not applicable. No tank liners were identified as being subject to an AMR.

On the basis of its audit and review, the project team finds that scaling, cracking, and spalling due to repeated freeze-thaw for Groups 1-3, 5, 7-9 structures; scaling, cracking, spalling and increase in porosity and permeability due to leaching of calcium hydroxide and aggressive chemical attack for Groups 1-5, 7-9 structures; expansion and cracking due to reaction with aggregates for Groups 1-5, 7-9 structures; cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel for Groups 1-5, 7-9 structures; cracks, distortion, and increase in component stress level due to settlement for Groups 1-3, 5, 7-9 structures; and loss of material due to corrosion of structural steel components for Groups 1-5, 7-8 structures are within the scope of license renewal and will be adequately managed by the applicant's Structures Monitoring Program.

During the audit and review, the project team interviewed members of the applicant's technical staff and reviewed relevant operating experience to confirm that these aging effects/mechanisms have not been observed or when observed, corrective action taken under the applicant's Structures Monitoring Program. Through the interviews with the applicant's technical staff and review of applicable documentation, the project team finds that the recommendations of the GALL Report have been satisfied and a plant-specific AMP for these aging effects/mechanisms of Class I structures is not required.

On the basis of its audit and review, the project team finds that reduction of foundation strength due to erosion of porous concrete subfoundations of Groups 1-3, 5,and 7-9 structures is not a plausible aging effect/mechanism due to the absence of the aging effect/mechanism. The applicant states that porous concrete subfoundations were not utilized below the building foundations for Groups 1-3, 5, and 5-9 structures. The project team agrees with the applicant that an AMP is not required since this aging effect/mechanism does not occur at NMP Unit 1.

The project team finds the applicant's further evaluation for elevated temperatures acceptable since change in material properties due to elevated temperatures is an aging effect/mechanism not requiring management for the NMP Unit 1 Groups 1-5 Class I structures.

The applicant states in the NMP ALRA, that the aging effects/mechanisms of crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liners for NMP Unit 1 Group 7 and 8 structures are not applicable, since no tank liners were identified as subject to AMR. On the basis of its audit and review, the project team concurs that no AMP is required for the above aging effects/mechanisms for stainless steel liners for Group 7 and 8 structures.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.5.2.2.2.1 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5A.2.2.2 Aging Management of Inaccessible Areas (NMP ALRA Section 3.5.2.C.2.2)

The project team reviewed NMP ALRA Section 3.5.2.C.2.2 against the criteria in SRP-LR Section 3.5.2.2.2.2.

SRP-LR Section 3.5.2.2.2.2 states that cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel could occur in below-grade inaccessible concrete areas. The GALL Report recommends further evaluation to manage these aging effects/mechanisms in inaccessible areas of Groups 1-3, 5, 7-9 structures, if specific conditions defined in the GALL Report cannot be satisfied.

In NMP ALRA Section 3.5.2.C.2.2, the applicant addresses aging management of inaccessible areas of Class I structures.

In the NMP LRA, the applicant states, that for NMP Unit 1, cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack; and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel are not significant. Ground water tests confirm that a below-grade aggressive environment does not exist. Although evaluated as not significant, the applicant credits NMP AMP B2.1.28, “Structures Monitoring Program,” to monitor for aggressive chemical attack and corrosion of embedded steel. A regularly scheduled ground water monitoring program will be implemented to ensure that a benign environment is maintained. The project team reviewed the applicant’s Structures Monitoring Program and its evaluation is documented in Section 2.27 of this audit and review report.

The project team determined through discussions with the applicant’s technical staff and review of the NMP ALRA that the recommendations of the GALL Report have been satisfied and a plant-specific AMP for inaccessible concrete of Class I (Groups 1-3, 5, 7-9) structures is not required for these locally insignificant aging effect/mechanisms.

On the basis that NMP does not currently have an aggressive environment aging effect/mechanism for inaccessible concrete, with regularly scheduled ground water monitoring to be implemented to ensure the below-grade environment remains non-aggressive, the project team finds that these aging effects/mechanisms (cracking, spalling, increases in porosity and permeability, loss of bond, loss of material) are not applicable to NMP Groups 1-3, 5, 7-9 Class I structures.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.5.2.2.2.2 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5A.2.3 Component Supports (NMP LRA Section 3.5.2.C.3)

3.5A.2.3.1 Aging of Supports Not Covered By Structures Monitoring Program (NMP ALRA Section 3.5.2.C.3.1)

The project team reviewed NMP ALRA Section 3.5.2.C.3.1 against the criteria in SRP-LR Section 3.5.2.2.3.1.

SRP-LR Section 3.5.2.2.3.1 states that the GALL Report recommends further evaluation of certain component support/aging effect/mechanism combinations if they are not covered by the applicant's Structures Monitoring Program. This includes (1) reduction in concrete anchor capacity due to degradation of the surrounding concrete, for Groups B1-B5 supports; (2) loss of material due to environmental corrosion, for Groups B2-B5 supports; and (3) reduction/loss of isolation function due to degradation of vibration isolation elements, for Group B4 supports. Further evaluation is necessary only for structure/aging effect combinations not covered by the applicant's Structures Monitoring Program.

In NMP ALRA Section 3.5.2.C.3.1, the applicant addresses aging of component supports not covered by NMP AMP B2.1.28, "Structures Monitoring Program."

In the NMP ALRA, the applicant states, that aging management of component supports will be performed through general visual inspections of its Structures Monitoring Program. Aging management is performed for the following aging effect/mechanism combinations: reduction in concrete anchor capacity due to degradation of the surrounding concrete, loss of material due to environmental corrosion, and reduction/loss of isolation function due to degradation of vibration isolation elements.

The project team finds that the applicant's Structures Monitoring Program covers reduction in concrete anchor capacity due to degradation of the surrounding concrete, for Groups B1 through B5 supports; loss of material due to environmental corrosion, for Groups B2 through B5 supports; and reduction/loss of isolation function due to degradation of vibration isolation elements, for Group B4 supports. In accordance with the GALL Report, no further evaluation is required by the applicant and therefore, it has not been provided.

The project team finds that the applicant has included the above aging effect/mechanism combinations within the scope of its Structures Monitoring Program and agrees that no further evaluation is required. The project team reviewed the applicant's Structures Monitoring Program and its evaluation is documented in Section 2.27 of this audit and review report. The project team finds the applicant's Structures Monitoring Program acceptable for managing the above aging effect/mechanism combinations of component supports for the GALL Report component support Groups B1 through B5, as those combinations are applicable.

The project team finds that, based on the program identified above, the applicant has met the criteria of SRP-LR Section 3.5.2.2.3.1 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5A.2.3.2 Cumulative Fatigue Damage Due to Cyclic Loading (NMP ALRA Section 3.5.2.C.3.2)

NMP ALRA Section 3.5.2.C.3.2 is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The TLAA is reviewed by the NRR DE staff. The evaluation of this TLAA will be addressed separately in Section 4 of the SER related to the NMP ALRA.

3.5A.2.4 Quality Assurance for Aging Management of Non-Safety-Related Components (NMP ALRA Section 3.5.2.C.4)

NMP ALRA Section 3.5.2.D.4 is reviewed by the NRR DIPM staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA.

Conclusion

On the basis of its review, for component groups evaluated in the GALL Report for which the GALL Report recommends further evaluation, the project team determined that the applicant adequately addressed these issues. For these items, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B NMP ALRA Unit 2 Section 3.5 - Aging Management of Structures and Component Supports

In NMP ALRA Section 3.5.2, the applicant provided the results of its AMRs for the structures and component supports.

In NMP ALRA Tables 3.5.2.B-1 through 3.5.2.B-13, the applicant provided a summary of the AMR results for component types associated with the (1) primary containment structure; (2) reactor building; (3) auxiliary service building; (4) control room building; (5) diesel generator building; (6) essential yard structures; (7) fuel handling system; (8) main stack; (9) material handling system; (10) radwaste building; (11) screenwell building; (12) standby gas treatment building; and (13) turbine building. The summary information for each component type included intended function; material; environment; aging effect/mechanism requiring management; AMPs; the GALL Report Volume 2 item; cross reference to NMP ALRA Table 3.5.1.B (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

For each component type in NMP ALRA Table 3.5.1.B, the applicant identified those component types that are managed in a manner consistent with the GALL Report, component types for which the GALL Report recommends further evaluation, and those AMRs that are not addressed in the GALL Report together with the method proposed for their aging management.

The project team conducted its audit and review in accordance with SRP-LR Section 3.5.3 and the NMP audit and review plan. The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report.

3.5B.1 Aging Management Review Results That Are Consistent with the GALL Report

For aging management evaluations that the applicant states are consistent with the GALL Report, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the NMP ALRA is acceptable.

The project team reviewed its assigned NMP ALRA line items to determine that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects/mechanisms have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects/mechanisms for the primary containment structure, reactor building, auxiliary service building, control room building, diesel generator building, essential yard structures, fuel handling system, main stack, material handling system, radwaste building, screenwell building, standby gas treatment building, and turbine building components that are subject to an AMR.

The following subparagraphs identify differences, when compared to the GALL Report, that were identified by the project team during the audit and review.

3.5B.1.1 Crack Initiation and Growth Due to SCC; Loss of Material Due to Crevice Corrosion

During the audit and review, the project team noted that in NMP ALRA Table 3.5.2.B-2 (Page 3.5-96) for component type liners and aging effect/mechanism cracking, the GALL Report Volume 2 line item shown is Item III.A5.2-b with NMP ALRA Table 3.5.1.B, Item 3.5.1.B-23. The Note D shown states that the component is different from the GALL Report line item. During the audit and review, the project team asked the applicant to explain how this AMR line item component is different from the GALL Report when GALL Report Item III.A5.2-b is also for the component liners.

In a letter dated December 1, 2005, the applicant states that the note referenced should be Note B instead of Note D. The reference would be to Note A, except the AMP shown takes exceptions to the GALL Report AMP. The applicant further states that NMP ALRA Table 3.5.3.B-2 is revised to change Note D to Note B for all AMR line item component liners with aging effect/mechanism cracking.

The project team reviewed the applicant's response and finds the correction of Note D to Note B acceptable because the proper note is assigned to this AMR line item.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

3.5B.1.2 <u>Aging of Component Supports</u>

During the audit and review, the project team noted that in NMP ALRA Table 3.5.2.B-2 (Page 3.5-94) for component type expansion/grouted anchors and aging effect/mechanism loss of anchor capacity, the GALL Report Volume 2 line item shown is Item III.B1.2.3-a with NMP ALRA Table 3.5.1.B, Item 3.5.1.B-29. The environment is shown as concrete and the note states that it is consistent with the GALL Report. During the audit and review, the project team asked the applicant to explain how this AMR line item is consistent with the GALL Report when the GALL Report line item has a component type of concrete surrounding anchor bolts, a material of concrete, an environment of inside or outside containment and an aging effect/mechanism of reduction in anchor capacity. The logic of this NMP AMR line item is not consistent with the GALL Report. This also applies to NMP ALRA Table 3.5.2.B-4 (Page 3.5-101); NMP ALRA Table 3.5.2.B-5 (Page 3.5-103); NMP ALRA Table 3.5.2.B-6 (Page 3.5-106); NMP ALRA Table 3.5.2.B-8 (Page 3.5-111); NMP ALRA Table 3.5.2.B-10 (Page 3.5-114); NMP ALRA Table 3.5.2.B-11 (Page 3.5-117) and NMP ALRA Table 3.5.2.B-13 (Page 3.5-124) for component type expansion/grouted anchors. The applicant was also asked to explain why for NMP ALRA Table 3.5.2.B-11 component type expansion/grouted anchors (wrought austenitic stainless steel) in raw water, NMP ALRA Table 3.5.1.A, Item 3.5.1.A-29 is shown with a NMP Unit 2 component.

In a letter dated December 1, 2005, the applicant states that it will make the NMP ALRA consistent with the GALL Report for all of the expansion/grouted anchor AMR line items listed above. For all the AMR line items above, except in NMP ALRA Table 3.5.2.B-11, the NMP ALRA current line for carbon steel in concrete is revised. In its place, component type is changed to concrete surrounding anchor bolts, the material of carbon steel is replaced with concrete (new line with the current line that starts with concrete), the environment of concrete is replaced with air and the rest of the lines will remain as they are currently displayed. For NMP ALRA Table 3.5.2.B-11, the NMP ALRA current line for wrought austenitic stainless steel in concrete is revised. In its place, the component type is changed to concrete surrounding anchor bolts, the material of wrought austenitic stainless steel is replaced with concrete (new line with the current line that starts with concrete), the environment of concrete is replaced with raw water and the rest of the line will remain as currently displayed except for the GALL Report item, note and Table 1 line item. The NMP ALRA Table 3.5.1.A, Item 3.5.1.A-29 is an error and the applicant revised the cell in the table to be blank. The cell for the GALL Report item is also blank and the note is now Note G. NMP used the AERM of loss of anchor capacity instead of reduction in anchor capacity per the GALL Report, however, it is intended that these terms have exactly the same meaning.

The project team reviewed the applicant's response and finds that after revision of the applicant's AMR line items as described above, these line items for the component expansion/grouted anchor (now component type, concrete surrounding anchor bolts, after revision) are consistent with the GALL Report and therefore acceptable.

On the basis of its review the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

During the audit and review, the project team noted that in NMP ALRA Table 3.5.2.B-11 (Page 3.5-117) for component type expansion/grouted anchors (carbon and low alloy steel in air) and aging effect/mechanism loss of anchor capacity, the GALL Report Volume 2 line item shown is Item III.B1.2.3-a with NMP ALRA Table 3.5.1.B, Item 3.5.1.A-29. However, no environment is shown and the note states that it is consistent with the GALL Report. During the audit and review, the project team asked the applicant to explain how this AMR line item is consistent with the GALL Report when the GALL Report line item has a component type of concrete surrounding anchor bolts, a material of concrete, an environment of inside or outside containment and an aging effect/mechanism of reduction in anchor capacity. The logic of this NMP AMR line item is not consistent with the GALL Report. Also, the applicant was asked to explain why the NMP ALRA Table 3.5.1.B line item shown is Item 3.5.1.A-29 instead of Item 3.5.1.B-29.

In a letter dated December 1, 2005, the applicant states that it will make the NMP ALRA consistent with the GALL Report for the expansion/grouted anchor AMR line item listed above. The NMP ALRA current line for carbon steel with no environment shown is revised. In its place, the component type is changed to concrete surrounding anchor bolts, the material of carbon steel is replaced with concrete (new line with the current line that starts with concrete), the missing environment is replaced with air and the rest of the line will remain as it is currently displayed, except the Table 1 entry. The applicant used the AERM of loss of anchor capacity instead of reduction in anchor capacity per the GALL Report, however, it is intended that these terms have exactly the same meaning. The Table 1 entry of Item 3.5.1.A-29 is an error and is revised to Item 3.5.1.B-29.

The project team reviewed the applicant's response and finds that after revision of the applicant's AMR line item as described above, this line item for the component expansion/grouted anchor (now component type, concrete surrounding anchor bolts, after revision) is consistent with the GALL Report and therefore acceptable. The project team also finds the correction of the reference to NMP ALRA Table 3.5.1.B, Item 3.5.1.B-29 appropriate.

On the basis of its review the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

During the audit and review, the project team noted that in NMP ALRA Table 3.5.2.C-1 (Page 3.5-126) for component type expansion/grouted anchors (carbon and low alloy steel in air) and aging effect/mechanism loss of anchor capacity, the GALL Report Volume 2 line item shown is Item III.B1.2.3-a with the Table 1 line items shown as Items 3.5.1.A-29 and 3.5.1.B-29. The environment is shown as concrete and the note states that it is consistent with the GALL Report. During the audit and review, the project team asked the applicant to explain how this AMR line item is consistent with the GALL Report when the GALL Report line item has a component type of concrete surrounding anchor bolts, a material of concrete, an environment of inside or outside containment and an aging effect/mechanism of reduction in anchor capacity. The logic of this NMP AMR line item is not consistent with the GALL Report. This also applies to NMP ALRA Table 3.5.2.C-1 (Page 3.5-127) for component type expansion/grouted anchors (wrought austenitic stainless steel in air).

In a letter dated December 1, 2005, the applicant states that it will make the NMP ALRA consistent with the GALL Report for all of its expansion/grouted anchor AMR line items listed above. For the AMR line item on Page 3.5-126 above, the NMP ALRA current line for carbon steel in concrete is revised. In its place, the component type is changed to concrete surrounding anchor bolts, the material of carbon steel is replaced with concrete (new line with the current line that starts with concrete), the environment of concrete is replaced with air and the rest of the line will remain as it is currently displayed. For the AMR line item on Page 3.5-127 above, the NMP ALRA current line for wrought austenitic stainless steel in concrete is revised. In its place, the component type is changed to concrete surrounding anchor bolts, the material of wrought austenitic stainless steel is replaced with concrete (new line with the current line that starts with concrete), the environment of concrete is replaced with air and the rest of the line will remain as currently displayed except the Table 1 line items. The Table 1 item should be Item 3.5.1.B-29 only since the line is for NMP Unit 2 only. The lines for aging management by the ASME Section XI IWF remain as they are currently entered on NMP ALRA Pages 3.5-126 and 3.5-127. The applicant used the AERM of loss of anchor capacity instead of reduction in anchor capacity per the GALL Report, however, it is intended that these terms have exactly the same meaning.

The project team reviewed the applicant’s response and finds that after revision of the applicant’s AMR line items as described above, these line items for the component expansion/grouted anchor are consistent with the GALL Report and therefore acceptable.

On the basis of its review the project team finds that the applicant appropriately addressed the aging effect/mechanism, as recommended by the GALL Report.

<u>Conclusion</u>

The project team has evaluated the applicant's claim of consistency with the GALL Report. The project team also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects/mechanisms. On the basis of its review, the project team finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the project team finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL Report

For some line items assigned to the project team in NMP ALRA Tables 3.5.2.B-1 through 3.5.2.B-13, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in NMP ALRA Section 3.5.2.D against the criteria provided in SRP-LR Section 3.5.2.2. The project team's assessments of these evaluations are documented in this section. These assessments are applicable to each Table 2 line item in NMP ALRA Section 3.5.2 that includes a reference to the item in Table 1 for which further evaluation is recommended.

3.5B.2.1 PWR and BWR Containments (NMP ALRA Section 3.5.2.C.1)

3.5B.2.1.1 Aging of Inaccessible Concrete Areas (NMP ALRA Section 3.5.2.C.1.1)

The project team reviewed NMP ALRA Section 3.5.2.C.1.1 against the criteria in SRP-LR Section 3.5.2.2.1.1.

SRP-LR Section 3.5.2.2.1.1 states that cracking, spalling, and increases in porosity and permeability due to leaching of calcium hydroxide and aggressive chemical attack; and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel could occur in inaccessible areas of PWR concrete and steel containments; BWR Mark II concrete containments; and Mark III concrete and steel containments. The GALL Report recommends further evaluation of plant-specific programs to manage the aging effects/mechanisms for inaccessible areas if specific conditions defined in the GALL Report cannot be satisfied.

In NMP ALRA Section 3.5.2.C.1.1, the applicant addresses aging of inaccessible concrete areas in BWR containments.

In the NMP ALRA, the applicant states, that for NMP Unit 2, the aging of inaccessible concrete areas due to leaching of calcium hydroxide, aggressive chemical attack, and corrosion of embedded steel are not significant for concrete components of the primary containment structure. The concrete was designed in accordance with ACI 318-71 and ACI 318-77, and constructed in accordance with ACI 301, which meets the intent of ACI 201.2R-77. This ensures a durable concrete that is dense, well-cured, has low permeability, and for which cracking is well controlled. Additionally, NMP Unit 2 is not exposed to aggressive ground water. As part of NMP AMP B2.1.28, "Structures Monitoring Program," a regularly scheduled ground water monitoring will be implemented to ensure that a benign environment is maintained.

In addition, in the NMP ALRA, the applicant states, that although evaluated as not significant, NMP Unit 2 credits NMP AMP B2.1.24, "ASME Section XI Inservice Inspection (IWL) Program," to monitor for aging of inaccessible concrete areas. Inaccessible concrete areas are compared against accessible concrete areas with similar environments. If warranted, additional inspections are performed. The project team reviewed the applicant's ASME Section XI Inservice Inspection (IWL) Program and its evaluation is documented in Section 2.23 of this audit and review report.

On the basis of its audit and review, the project team finds that cracking, spalling and increases in porosity and permeability of inaccessible containment concrete due to leaching of calcium hydroxide and aggressive chemical attack; and cracking, spalling, loss of bond, loss of material of inaccessible containment concrete due to corrosion of embedded steel are not plausible aging effects/mechanisms due to the nonexistence of these aging effect/mechanisms in accordance with the GALL Report. Through interviews with the applicant's technical staff and review of applicable documentation, the project team finds that the NMP Unit 2 concrete containment is designed in accordance with ACI 318 and constructed of concrete using ingredients conforming to ACI and ASTM standards in accordance with the recommendations of the GALL Report. In addition, ground water sample testing monitoring has demonstrated that an aggressive environment does not exist at NMP Unit 2 for inaccessible concrete. NMP has demonstrated that aggregates used for containment concrete were in accordance with ACI 301, which meets the intent of ACI 201.2R-77 for good quality concrete. The project team finds that the recommendations of the GALL Report have been satisfied and a plant-specific AMP for inaccessible containment concrete is not required.

The project team finds that, based on the program identified above, the applicant has met the criteria of SRP-LR Section 3.5.2.2.1.1 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.1.2 Cracking, Distortion and Increase in Component Stress Level Due to Settlement; Reduction of Foundation Strength Due to Erosion of Porous Concrete Subfoundation If Not Covered By Structures Monitoring Program (NMP ALRA Section 3.5.2.C.1.2)

The project team reviewed NMP ALRA Section 3.5.2.C.1.2 against the criteria in SRP-LR Section 3.5.2.2.1.2.

SRP-LR Section 3.5.2.2.1.2 states that cracking, distortion, and increase in component stress level due to settlement could occur in PWR concrete and steel containments and BWR Mark II concrete containments and Mark III concrete and steel containments. Also, reduction of foundation strength due to erosion of porous concrete subfoundations could occur in all types of PWR and BWR containments. Some plants may rely on a de-watering system to lower the site ground water level. If the plant's CLB credits a de-watering system, the GALL Report recommends verification of the continued functionality of the de-watering system during the period of extended operation. The GALL Report recommends no further evaluation if this activity is included in the scope of the applicant's Structures Monitoring Program.

In NMP ALRA Section 3.5.2.C.1.2, the applicant addresses cracking, distortion, and increase in component stress level due to settlement; and reduction of foundation strength due to erosion of porous concrete subfoundations in BWR containments.

In the NMP ALRA, the applicant states, that for NMP Unit 2, cracking, distortion, and an increase in component stress level due to settlement is not significant. The primary containment structure is founded on impervious rock. Although evaluated as not significant, NMP Unit 2 credits NMP AMP B2.1.28, "Structures Monitoring Program," to monitor for settlement. NMP Unit 2 does not utilize a de-watering system. The project team reviewed the applicant's Structures Monitoring Program and its evaluation is documented in Section 2.27 of this audit and review report.

In the NMP ALRA, the applicant further states, that for NMP Unit 2, reduction of foundation strength due to erosion of porous concrete subfoundation is not applicable. Porous concrete is not utilized in the construction of the primary containment structure.

On the basis of its audit and review, the project team finds that cracking, distortion, and increase in component stress level due to containment settlement and reduction of containment foundation strength due to erosion of porous concrete subfoundations are not plausible aging effects/mechanisms due to the nonexistence of these aging effect/mechanisms. The applicant states that the aging effects/mechanisms due to settlement are not expected at NMP Unit 2 for the containment structure since it is founded on impervious rock. In addition, porous concrete was not utilized in the construction of the primary containment structure. The project team agrees with the applicant that an AMP is not required since these aging effect/mechanisms do not occur at NMP. However, the applicant has conservatively elected to use its Structures Monitoring Program to monitor for settlement, which the project team finds acceptable.

The project team finds that, based on the conservative application of the program identified above to monitor for settlement and a porous concrete subfoundation does not exist for the NMP Unit 2 containment, the applicant has met the criteria of SRP-LR Section 3.5.2.2.1.2 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.1.3 Reduction of Strength and Modulus of Concrete Structures Due to Elevated Temperature (NMP ALRA Section 3.5.2.C.1.3)

The project team reviewed NMP ALRA Section 3.5.2.C.1.3 against the criteria in SRP-LR Section 3.5.2.2.1.3.

SRP-LR Section 3.5.2.2.1.3 states that reduction of strength and modulus of elasticity due to elevated temperatures could occur in PWR concrete and steel containments and BWR Mark II concrete containments and Mark III concrete and steel containments. The GALL Report recommends further evaluation if any portion of the concrete containment components exceeds specified temperature limits, i.e., general area temperature 66EC (150EF) and local area temperature 93EC (200EF).

In NMP ALRA Section 3.5.2.C.1.3, the applicant addresses reduction of strength and modulus of concrete structures due to elevated temperature in BWR containments.

In the NMP ALRA, the applicant states, that for NMP Unit 2, reduction of strength and modulus of concrete structures due to elevated temperature is not significant. In the primary containment structure, general area temperatures do not exceed 150EF and local area temperatures do not exceed 200EF. These temperatures are not sufficient to result in this aging effect/mechanism for the applicable components.

The applicant states, in the NMP ALRA, that for the NMP Unit 2 primary containment, this aging effect/mechanism is not applicable to NMP. The applicant states that during normal operation, all areas within the containment building do not experience elevated temperatures greater than 150EF general and greater than 200EF local. Therefore, change in material properties (reduction of strength and modulus of concrete) due to elevated temperature is not an aging effect/mechanism requiring management for the NMP containment concrete. The project team determined through discussions with the applicant's technical staff that operating experience indicates that the containment concrete has never experienced any aging effects/mechanisms due to elevated temperatures.

On the basis that NMP does not have a containment concrete elevated temperature aging effect/mechanism, the project team finds that this aging effect/mechanism is not applicable to NMP.

3.5B.2.1.4 Loss of Material Due to Corrosion in Inaccessible Areas of Steel Containment Shell or Liner Plate (NMP ALRA Section 3.5.2.C.1.4)

The project team reviewed NMP ALRA Section 3.5.2.C.1.4 against the criteria in SRP-LR Section 3.5.2.2.1.4.

SRP-LR Section 3.5.2.2.1.4 states that loss of material due to corrosion could occur in inaccessible areas of the steel containment shell or the steel liner plate for all types of PWR and BWR containments. The GALL Report recommends further evaluation of plant-specific programs to manage this aging effect/mechanism for inaccessible areas if specific conditions defined in the GALL Report cannot be satisfied.

In NMP ALRA Section 3.5.2.C.1.4, the applicant addresses loss of material due to corrosion in inaccessible areas of steel containment shell or liner plate in BWR containments.

For NMP Unit 2, NMP AMP B2.1.23, "ASME Section XI Inservice Inspection (IWE) Program," is credited for managing aging effects/mechanisms due to corrosion of accessible primary containment structure carbon steel components comprising the containment pressure boundary. Inaccessible areas are compared against accessible areas with similar environments. If warranted, additional inspections are performed. The project team reviewed the applicant's ASME Section XI Inservice Inspection (IWE) Program and its evaluation is documented in Section 2.22 of this audit and review report.

The project team notes, as stated above in SRP-LR Section 3.5.2.2.1.4, that the GALL Report recommends further evaluation of plant-specific programs to manage this aging effect/mechanism for inaccessible areas if specific conditions defined in the GALL Report cannot be satisfied. In the GALL Report Item B1.1.1-a (Page II B1-3) states that for inaccessible areas (embedded containment steel shell or liner), loss of material due to corrosion is not significant if the following four specific conditions are satisfied:

1. Concrete meeting the requirements of ACI 318 or 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner.

2. The concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner.

3. The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with IWE requirements.

4. Borated water spills and water ponding on the containment concrete floor are not common and when detected are cleaned up in a timely manner.

The GALL Report states that if any of the four conditions cannot be satisfied, then a plant-specific AMP for corrosion is recommended. During the initial audit and review, the project team asked the applicant to provide an explanation for how each of the four conditions are satisfied at NMP Unit 2. The applicant addressed the four conditions as follows:

1. NMP Unit 2 was designed and constructed with equivalent codes as specified in the GALL Report.

2. The concrete is monitored in accordance with the applicant's ASME Section XI Inservice Inspection (IWE) and Structures Monitoring Programs.

3. This condition is not applicable to the NMP design.

4. This condition is not applicable to a BWR design.

On the basis of its audit and review, the project team finds that all of the conditions identified in the GALL Report are satisfied. The applicant states that the NMP Unit 2 containment was designed and constructed with equivalent codes as those specified in the GALL Report. Accessible concrete of the containment structure is monitored for penetrating cracks under the applicant's ASME Section XI Inservice Inspection (IWE) and Structures Monitoring Programs. Operating experience demonstrates that the aging effect/mechanism of loss of material due to corrosion has not been significant for the NMP Unit 2 steel containment shell. The project team finds that no additional plant-specific AMP is required to manage inaccessible areas of the steel containment shell.

The project team finds that, based on the programs identified above and the satisfaction of specific GALL Report conditions, the applicant has met the criteria of SRP-LR Section 3.5.2.2.1.4 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.1.5 <u>Loss of Prestress Due to Relaxation, Shrinkage, Creep and Elevated Temperature (NMP ALRA Section 3.5.2.C.1.5)</u>

The project team reviewed NMP ALRA Section 3.5.2.C.1.5 against the criteria in SRP-LR Section 3.5.2.2.1.5.

The applicant states, in the NMP ALRA, that for the loss of prestress due to relaxation, shrinkage, creep and elevated temperature in BWR containments, this aging effect/mechanism is not applicable to NMP Unit 2. For NMP Unit 2, prestressed tendons were not utilized in the construction of the primary containment structure. The project team determined through discussions with the applicant's technical staff that the loss of prestress due to relaxation, shrinkage, creep and elevated temperature in BWR containments does not apply to NMP Unit 2 since its primary containment does not contain prestressed tendons.

On the basis that NMP does not have any components from this group, the project team finds that this aging effect/mechanism is not applicable to NMP Unit 2.

3.5B.2.1.6 <u>Cumulative Fatigue Damage (NMP ALRA Section 3.5.2.C.1.6)</u>

NMP ALRA Section 3.5.2.C.1.6 is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The TLAA is reviewed by the NRR DE staff. The evaluation of this TLAA will be addressed separately in Section 4 of the SER related to the NMP ALRA.

3.5B.2.1.7 <u>Cracking Due to Cyclic Loading and SCC (NMP ALRA Section 3.5.2.C.1.7)</u>

The project team reviewed NMP ALRA Section 3.5.2.C.1.7 against the criteria in SRP-LR Section 3.5.2.2.1.7.

SRP-LR Section 3.5.2.2.1.7 states that cracking of containment penetrations (including penetration sleeves, penetration bellows, and dissimilar metal welds) due to cyclic loading or SCC could occur in all types of PWR and BWR containments. Cracking could also occur in vent line bellows, vent headers and downcomers due to SCC for BWR containments. A visual VT-3 examination would not detect such cracks. The GALL Report recommends further evaluation of the inspection methods implemented to detect these aging effects/mechanisms.

In NMP ALRA Section 3.5.2.C.1.7, the applicant addresses cracking due to cyclic loading and SCC in BWR containments.

In the NMP ALRA, the applicant also states, that for NMP Unit 2, NMP AMP B2.1.23, "ASME Section XI Inservice Inspection (Subsection IWE) Program," and NMP AMP B2.1.26, "10 CFR 50 Appendix J Program," are credited for managing cracking due to cyclic loading and SCC of primary containment structure steel components. In addition, an augmented VT-1 visual examination will be performed on containment bellows using enhanced techniques qualified for detecting SCC.

Based on the applicant's further evaluation as recommended by the GALL Report for detecting cracking due to SCC, the project team finds that the applicant has elected to perform augmented VT-1 visual examinations on containment bellows using enhanced techniques qualified for detecting SCC. The project team finds this consistent with the GALL Report and therefore acceptable.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.5.2.2.1.7 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.2 Class I Structures (NMP ALRA Section 3.5.2.C.2)

3.5B.2.2.1 Aging of Structures Not Covered By Structures Monitoring Program (NMP ALRA Section 3.5.2.C.2.1)

The project team reviewed NMP ALRA Section 3.5.2.C.2.1 against the criteria in SRP-LR Section 3.5.2.2.2.1.

SRP-LR Section 3.5.2.2.2.1 states that the GALL Report recommends further evaluation of certain structure/aging effect/mechanism combinations if they are not covered by the applicant's Structures Monitoring Program. This includes (1) scaling, cracking, and spalling due to repeated freeze-thaw for Groups 1-3, 5, 7-9 structures; (2) scaling, cracking, spalling and increase in porosity and permeability due to leaching of calcium hydroxide and aggressive chemical attack for Groups 1-5, 7-9 structures; (3) expansion and cracking due to reaction with aggregates for Groups 1-5, 7-9 structures; (4) cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel for Groups 1-5, 7-9 structures; (5) cracks, distortion, and increase in component stress level due to settlement for Groups 1-3, 5, 7-9 structures; (6) reduction of foundation strength due to erosion of porous concrete subfoundation for Groups 1-3, 5-9 structures; (7) loss of material due to corrosion of structural steel components for Groups 1-5, 7-8 structures; (8) loss of strength and modulus of concrete structures due to elevated temperatures for Groups 1-5; and (9) crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liner for Groups 7 and 8 structures. Further evaluation is necessary only for structure/aging effect combinations not covered by the applicant's Structures Monitoring Program.

SRP-LR Section 3.5.2.2.2.1 further states that technical details of the aging management issue are presented in Subsection 3.5.2.2.1.2 for Items (5) and (6) and Subsection 3.5.2.2.1.3 for Item (8).

In NMP ALRA Section 3.5.2.C.2.1, the applicant addresses aging of Class I structures not covered by NMP AMP B2.1.28, "Structures Monitoring Program."

In the NMP ALRA, the applicant also states, that there are no Group 6 structures (water control structures) at NMP Unit 2.

In addition, the applicant states in the NMP ALRA, that aging management of components in accessible areas of Class I structures will be performed through general visual inspections of its Structures Monitoring Program. Aging management is performed for the following aging effect/mechanisms: freeze-thaw, leaching of calcium hydroxide, aggressive chemical attack, reaction with aggregates, corrosion of embedded steel, and corrosion of structural steel. The project team reviewed the applicant's Structures Monitoring Program and its evaluation is documented in Section 2.27 of this audit and review report.

Further, the applicant states in the NMP ALRA, that for NMP Unit 2, cracking, distortion, and an increase in component stress level due to settlement for Group 1-3, 5, 7-9 structures is not significant. Class I structures are founded on impervious rock. Although evaluated as not significant, NMP Unit 2 credits its Structures Monitoring Program to monitor for settlement. NMP Unit 2 does not utilize a de-watering system.

The applicant also states, in the NMP ALRA, that for NMP Unit 2, reduction of foundation strength due to erosion of porous concrete subfoundation is not applicable since the Class I structures were designed and analyzed to ACI 318-71 and ACI 318-77. Nonetheless, NMP Unit 2 manages the aging of these components with its Structures Monitoring Program.

In the NMP ALRA, the applicant states, that for NMP Unit 2, loss of material due to corrosion of structural steel components for Group 1-5, 7-8 structures is managed by its Structures Monitoring Program. Although NMP Unit 2 vent stack steel and reactor cavity plug liner components are not identified in the GALL Report, these components are also managed by the applicant's Structures Monitoring Program.

In addition, the applicant states in the NMP ALRA, that for NMP Unit 2, loss of strength and modulus of concrete structures due to elevated temperatures for Group 1-5 structures is not significant. In Class I structures, general area temperatures do not exceed 150EF and local area temperatures do not exceed 200EF. These temperatures are not sufficient to result in this aging effect/mechanism for the applicable components.

Furthermore, the applicant states in the NMP ALRA, that for NMP Unit 2, crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liners for Group 7 and 8 structures is not applicable. No tank liners were identified as being subject to an AMR.

On the basis of its review, the project team finds that scaling, cracking, and spalling due to repeated freeze-thaw for Groups 1-3, 5, 7-9 structures; scaling, cracking, spalling and increase in porosity and permeability due to leaching of calcium hydroxide and aggressive chemical attack for Groups 1-5, 7-9 structures; expansion and cracking due to reaction with aggregates for Groups 1-5, 7-9 structures; cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel for Groups 1-5, 7-9 structures; cracks, distortion, and increase in component stress level due to settlement for Groups 1-3, 5, 7-9 structures; and loss of material due to corrosion of structural steel components for Groups 1-5, 7-8 structures are within the scope of license renewal and will be adequately managed by the applicant's Structures Monitoring Program.

During the audit and review, the project team interviewed members of the applicant's technical staff and reviewed relevant operating experience to confirm that these aging effects/mechanisms have not been observed or when observed, corrective action taken under the applicant's Structures Monitoring Program. Through the interviews with the applicant's technical staff and review of applicable documentation, the project team finds that the recommendations of the GALL Report have been satisfied and a plant-specific AMP for these aging effects/mechanisms of Class I structures is not required.

On the basis of its audit and review, the project team finds that reduction of foundation strength due to erosion of porous concrete subfoundations of Groups 1-3, 5,and 7-9 structures is not a plausible aging effect/mechanism due to the nonexistence of the aging effect/mechanism. The applicant states that porous concrete subfoundations were not utilized below the building foundations for Groups 1-3, 5, and 5-9 structures. The project team agrees with the applicant that an AMP is not required since this aging effect/mechanism does not occur at NMP Unit 2. However, the applicant has conservatively elected to manage the aging of these components with its Structures Monitoring Program.

The project team finds the applicant's further evaluation for elevated temperatures acceptable since change in material properties due to elevated temperatures is an aging effect/mechanism not requiring management for the NMP Unit 2 Groups 1-5 Class I structures.

The applicant states in the NMP ALRA, that the aging effects/mechanisms of crack initiation and growth due to SCC and loss of material due to crevice corrosion of stainless steel liners for NMP Unit 2 Group 7 and 8 structures are not applicable, since no tank liners were identified as subject to an AMR. On the basis of its audit and review, the project team concurs that no AMP is required for the above aging effects/mechanisms for stainless steel liners for Group 7 and 8 structures.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.5.2.2.2.1 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.2.2 Aging Management of Inaccessible Areas (NMP ALRA Section 3.5.2.C.2.2)

The project team reviewed NMP ALRA Section 3.5.2.C.2.2 against the criteria in SRP-LR Section 3.5.2.2.2.2.

SRP-LR Section 3.5.2.2.2.2 states that cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel could occur in below-grade inaccessible concrete areas. The GALL Report recommends further evaluation to manage these aging effects/mechanisms in inaccessible areas of Groups 1-3, 5, 7-9 structures, if specific conditions defined in the GALL Report cannot be satisfied.

In NMP ALRA Section 3.5.2.C.2.2, the applicant addresses aging management of inaccessible areas of Class I structures.

In the NMP ALRA, the applicant states, that for NMP Unit 2, cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack; and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel are not significant. Ground water tests confirm that a below-grade aggressive environment does not exist. Although evaluated as not significant, the applicant credits NMP AMP B2.1.28, “Structures Monitoring Program,” to monitor for aggressive chemical attack and corrosion of embedded steel. A regularly scheduled ground water monitoring will be implemented to ensure that a benign environment is maintained. The project team reviewed the applicant’s Structures Monitoring Program and its evaluation is documented in Section 2.27 of this audit and review report.

The project team determined through discussions with the applicant’s technical staff and review of the NMP ALRA that the recommendations of the GALL Report have been satisfied and a plant-specific AMP for inaccessible concrete of Class I (Groups 1-3, 5, 7-9) structures is not required for these nonexistent aging effects and aging effect/mechanisms.

On the basis that NMP does not currently have an aggressive environment aging effect/mechanism for inaccessible concrete, with regularly scheduled ground water monitoring to be implemented to ensure the below-grade environment remains non-aggressive, the project team finds that these aging effects/mechanisms (cracking, spalling, increases in porosity and permeability, loss of bond, loss of material) are not applicable to NMP Groups 1-3, 5, 7-9 Class I structures.

The project team finds that, based on the programs identified above, the applicant has met the criteria of SRP-LR Section 3.5.2.2.2.2 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.3 Component Supports (NMP ALRA Section 3.5.2.C.3)

3.5B.2.3.1 Aging of Supports Not Covered By Structures Monitoring Program (NMP ALRA Section 3.5.2.C.3.1)

The project team reviewed NMP ALRA Section 3.5.2.C.3.1 against the criteria in SRP-LR Section 3.5.2.2.3.1.

SRP-LR Section 3.5.2.2.3.1 states that the GALL Report recommends further evaluation of certain component support/aging effect/mechanism combinations if they are not covered by the applicant's Structures Monitoring Program. This includes (1) reduction in concrete anchor capacity due to degradation of the surrounding concrete, for Groups B1-B5 supports; (2) loss of material due to environmental corrosion, for Groups B2-B5 supports; and (3) reduction/loss of isolation function due to degradation of vibration isolation elements, for Group B4 supports. Further evaluation is necessary only for structure/aging effect combinations not covered by the applicant's Structures Monitoring Program.

In NMP ALRA Section 3.5.2.C.3.1, the applicant addresses aging of component supports not covered by NMP AMP B2.1.28, "Structures Monitoring Program."

In the NMP ALRA, the applicant states, that aging management of component supports will be performed through general visual inspections of its Structures Monitoring Program. Aging management is performed for the following aging effect/mechanism combinations: reduction in concrete anchor capacity due to degradation of the surrounding concrete, loss of material due to environmental corrosion, and reduction/loss of isolation function due to degradation of vibration isolation elements.

The project team finds that the applicant's Structures Monitoring Program covers reduction in concrete anchor capacity due to degradation of the surrounding concrete, for Groups B1 through B5 supports; loss of material due to environmental corrosion, for Groups B2 through B5 supports; and reduction/loss of isolation function due to degradation of vibration isolation elements, for Group B4 supports. In accordance with the GALL Report, no further evaluation is required by the applicant and therefore, it has not been provided.

The project team finds that the applicant has included the above aging effect/mechanism combinations within the scope of its Structures Monitoring Program and agrees that no further evaluation is required. The project team reviewed the applicant's Structures Monitoring Program and its evaluation is documented in Section 2.27 of this audit and review report. The project team finds the applicant's Structures Monitoring Program acceptable for managing the above aging effect/mechanism combinations of component supports for GALL Report component support Groups B1 through B5, as those combinations are applicable.

The project team finds that, based on the program identified above, the applicant has met the criteria of SRP-LR Section 3.5.2.2.3.1 for further evaluation. The project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5B.2.3.2 Cumulative Fatigue Damage Due to Cyclic Loading (NMP ALRA Section 3.5.2.C.3.2)

NMP ALRA Section 3.5.2.C.3.2 is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The TLAA is reviewed by the NRR DE staff. The evaluation of this TLAA will be addressed separately in Section 4 of the SER related to the NMP ALRA.

3.5B.2.4 Quality Assurance for Aging Management of Non-Safety-Related Components (NMP ALRA Section 3.5.2.C.4)

NMP ALRA Section 3.5.2.D.4 is reviewed by the NRR DIPM staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA.

Conclusion

On the basis of its review, for component groups evaluated in the GALL Report for which the GALL Report recommends further evaluation, the project team determined that the applicant adequately addressed these issues. For these items, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.6 NMP ALRA Section 3.6 - Aging Management of Electrical and Instrumentation and Controls Systems

In NMP ALRA Section 3.6.2.2, the applicant provided the results of its AMRs for the electrical and instrumentation and controls systems.

In NMP ALRA Tables 3.6.2.C-1 through 3.6.2.C-4, the applicant provided a summary of the AMR results for component types associated with the (1) cables and connectors; (2) non-segregated/switchyard bus; and (3) containment electrical penetrations. The summary information for each component type included intended function; material; environment; aging effect/mechanism requiring management; AMPs; the GALL Report Volume 2 item; cross reference to NMP ALRA Table 3.6.1 (Table 1); and generic and plant-specific notes related to consistency with the GALL Report.

For each component type in NMP ALRA Table 3.6.1, the applicant identified those component types that are managed in a manner consistent with the GALL Report, component types for which the GALL Report recommends further evaluation, and those AMRs that are not addressed in the GALL Report together with the method proposed for their aging management.

The project team conducted its audit and review in accordance with SRP-LR Section 3.6.3 and the NMP audit and review plan. The project team interviewed the applicant's technical staff and reviewed, in whole or in part, the documents listed in Attachment 5 of this audit and review report.

3.6.1 Aging Management Review Results That Are Consistent with the GALL Report

For aging management evaluations that the applicant states are consistent with the GALL Report, the project team conducted its audit and review to determine if the applicant's reference to the GALL Report in the NMP ALRA is acceptable.

The project team reviewed its assigned NMP ALRA line items for cable and connector components to determine that the applicant (1) provides a brief description of the system, components, materials, and environment; (2) states that the applicable aging effects/mechanisms have been reviewed and are evaluated in the GALL Report; and (3) identifies those aging effects/mechanisms for the cables and connectors components that are subject to an AMR.

On the basis of its review, the project team finds that the applicant appropriately addressed the aging effect/mechanisms, as recommended by the GALL Report.

Conclusion

The project team has evaluated the applicant's claim of consistency with the GALL Report. The project team also has reviewed information pertaining to the applicant's consideration of recent operating experience and proposals for managing associated aging effects/mechanisms. On the basis of its review, the project team finds that the AMR results, which the applicant claimed to be consistent with the GALL Report, are consistent with the AMRs in the GALL Report. Therefore, the project team finds that the applicant has demonstrated that the effects of aging for these components will be adequately managed so that their intended function(s) will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.6.2 Aging Management Review Results for Which Further Evaluation Is Recommended by the GALL Report

For some line items assigned to the project team in NMP ALRA Tables 3.6.2.C-1 through 3.6.2.C-4, the GALL Report recommends further evaluation. When further evaluation is recommended, the project team reviewed these further evaluations provided in NMP ALRA Section 3.6.2.2 against the criteria provided in SRP-LR Section 3.6.2.2. The project team's assessments of these evaluations are documented in this section. These assessments are applicable to each Table 2 line item in NMP ALRA Section 3.6.2 that includes a reference to the item in Table 1 for which further evaluation is recommended.

3.6.2.1 Electrical Equipment Subject to Environmental Qualification (NMP ALRA Section 3.6.2.C.1)

NMP ALRA Section 3.6.2.C.1 is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The TLAA is reviewed by the NRR DE staff. The evaluation of this TLAA will be addressed separately in Section 4 of the SER related to the NMP ALRA.

3.6.2.2 Quality Assurance for Aging Management of Non-Safety-Related Components (NMP ALRA Section 3.6.2.C.2)

NMP ALRA Section 3.6.2.C.2 is reviewed by the NRR DIPM staff and will be addressed separately in Section 3 of the SER related to the NMP ALRA.

Conclusion

On the basis of its review, for component groups evaluated in the GALL Report for which the GALL Report recommends further evaluation, the project team determined that the applicant adequately addressed these issues. For these items, the project team finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.6.3 Aging Management Review Results That Are Not Consistent with the GALL Report or Not Addressed in the GALL Report

3.6.3.1 Non-Segregated/Switchyard Bus

The phase bus is used to connect two or more elements (electrical equipment such as switchgear and transformers) of an electrical circuit. The isolated phase bus is an electrical bus in which each phase conductor is enclosed by an individual metal housing separated from an adjacent conductor housing by an air space. A non-segregated phase bus is an electrical bus constructed with all phase conductors in a common enclosure without barriers (only air space) between the phases.

In the NMP ALRA, the applicant states that the materials of construction for the phase bus components are the following:

- aluminum
- cement
- metal
- porcelain
- steel
- various organic polymers

The applicant also states, in the NMP ALRA, that phase bus components are exposed to an air environment.

In NMP ALRA Table 3.6.2.C-2, the applicant identifies loss of insulation resistance and loosening of bolted connections as the aging effects/mechanisms associated with phase bus components requiring aging management.

The applicant credits NMP AMP B.2.1.34, “Non-Segregated Bus Inspection Program,” to manage the potential aging effects/mechanisms for the phase bus components.

Interim Staff Guidance (ISG)-17, “Proposed Aging Management Program (AMP) XI.E4, 'Periodic Inspection of Bus Ducts,'” includes enclosed bus and enclosure assemblies as the structure and/or component of the metal enclosed bus. During the audit and review, the project team noted that NMP ALRA Table 3.6.2.C-2 does not include this component. The project team requested that the applicant provide justification why the enclosure assembly is not included in the structure and/or component category.

In a letter dated December 1, 2005, the applicant states that it will revise NMP ALRA Table 3.6.2.C-2 to include the component types of bus duct enclosure and seals and gaskets. The applicant stated that the intended function for both components is shelter/protection, with the materials of aluminum for the enclosure and polymers for the seals and gaskets both in an environment of air. The applicant also states, in the letter, that there are no aging effects/mechanisms requiring management for the aluminum enclosure and the aging effects/mechanisms of the seals and gaskets are cracking, hardening and shrinkage which will be managed by NMP AMP B2.1.28, “Structures Monitoring Program.” There are no notes for the bus duct enclosure and Note H for the seals and gaskets.

The project team confirmed that the applicant has identified the applicable aging effects/mechanisms, listed the appropriate combination of material and environments, and AMPs that will adequately mange the aging effects/mechanisms. The project team agreed that the applicant correctly identified the aging effects/mechanisms associated with phase bus components. In addition, the project team finds that there are no aging effects/mechanisms requiring management for the aluminum enclosure. The project team also finds cracks, foreign debris, excessive dust built up, evidence of water intrusion as additional aging effects/mechanisms which are adequately addressed in NMP AMP B2.1.34. The applicant will credit the Non-Segregated Bus Inspection Program for aging management of in-scope non-segregated phase bus and the applicant’s Structures Monitoring Program to manage the aging effects/mechanisms of the enclosure seals and gasket at NMP. The evaluations of these programs are addressed in Sections 2.31 and 2.27 of this audit and review report, respectively.

On the basis of its audit and review, the project team concludes that the applicant has adequately identified the aging effects/mechanisms, and has an adequate program for managing the aging effects/mechanisms for the non-segregated/switchyard bus, such that there is reasonable assurance that the component’s intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.6.3.2 Non-EQ Electrical/I&C Penetration Assemblies

The applicant states, in NMP ALRA Section 3.6.2.1.3, that the material of construction for the containment electrical penetration is various organic polymers. The containment electrical penetrations are exposed to adverse localized environment caused by heat or radiation and air. The aging effects/mechanisms associated with the containment electrical penetration require management are loss of insulation resistance and loss of tightness. The applicant credits NMP AMP B2.1.23, “ASME Section XI Inservice Inspection (Subsection IWE) Program,” NMP AMP B2.1.29, “Non-EQ Cables and Connections Program,” and NMP AMP B2.1.26, “10 CFR

Appendix J Program," for managing the aging effects/mechanisms for the containment penetrations.

In NMP ALRA Section 3.6.2.1.3, the applicant states that the penetration assembly primary insulation materials are various organic polymers. During the audit and review, it was not clear to the project team why the metals and inorganic materials (such as cable fillers, epoxies, potting compounds, connector pins, plugs, and facial grommets) associated with non-EQ electrical/I&C penetration assemblies do not require an AMR.

In a letter dated December 1, 2005, the applicant states that electrical penetrations at NMP do not contain any cable fillers, epoxies, potting compounds, connector pins, plugs, or facial grommets within the steel sleeve, and the interior of the penetration is inserted with nitrogen. The applicant further states that aging of inaccessible seal material used on the ends of the sleeves is managed by its 10 CFR Appendix J Program. The project team reviewed the applicant's response and finds it acceptable because containment electrical penetrations at NMP do not contain inorganic materials and the potential aging effects/mechanisms of penetration wiring insulation will be addressed by the Non-EQ Cables and Connections Program. In addition, the leak test performed as required by the applicant's Appendix J Program will test the boundary function of the non-EQ electrical and I&C penetrations. The applicant's Non-EQ Electrical Cables and Connections and 10 CFR Appendix J Programs are evaluated in Sections 2.29 and 2.25 of the audit and review report, respectively.

On the basis of its audit and review, the project team concludes that the applicant has adequately identified the aging effects/mechanisms, and has an adequate program for managing the aging effects/mechanisms for containment electrical penetrations, such that there is reasonable assurance that the component intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Attachment 1

Abbreviations and Acronyms

10 CFR Part 54	Title 10 of the Code of Federal Regulations, Part 54
ACI	American Concrete Institute
ADAMS	(Agencywide Documents Access and Management System
ADH	alternate decay heat
AERM	aging effects requiring management
ALRA	amended license renewal application
AMP	aging management program
AMR	aging management review
ASME	American Society Of Mechanical Engineers
ASTM	American Society for Testing Materials
ATWS	anticipated transients without scram
BWR	boiling water reactor
BWRVIP	boiling water reactor vessel internals program
BWRSCC	BWR stress corrosion cracking
CAP	corrective action program
CAQ	conditions adverse to quality
CASS	cast austenitic stainless steel
CCCW	closed-cycle cooling water
CCCWS	closed-cycle cooling water system
CFR	Code of Federal Regulations
CLB	current licensing basis
CMAA	Crane Manufacturers Association of America
CRD	control rod drive
CRDRL	control rod drive return line
CTN-SP	containment spray
CUF	cumulative usage factor
CW	circulating water
DE	NRC’s Division of Engineering
DER	deviation event report
DG	diesel generator
DIPM	NRC’s Division of Inspection Program Management
E/C	erosion/corrosion
EC	emergency condenser
ECCS	emergency core cooling system
ECP	electrochemical potential
ECT	eddy current testing

EDG	emergency diesel generator
EGS	exchangers, diesel generator
EMEB	Engineering, Mechanical and Civil Engineering Branch
EPRI	Electric Power Research Institute
EQ	environmental qualification
EQEDC	environmental qualification design criteria
FAC	flow-accelerated corrosion
FP	flood protection
FPP	fire protection program
FSAR	Final Safety Analysis Report
FW	feedwater
FWSP	fire water system program
GALL	Generic Aging Lessons Learned
GE	General Electric
GL	generic letter
GQE	generic qualification evaluation
HAZ	heat affected zone
HVAC	heating, ventilation, and air conditioning
HWC	hydrogen water chemistry
I&C	instrumentation and controls
IASCC	irradiation-assisted stress corrosion cracking
IGA	intergranular attack
IGSCC	intergranular stress corrosion cracking
IN	Information Notice
INPO	Institute of Nuclear Power Operations
IRM	intermediate range monitoring
ISI	inservice inspection
ISL	Information Systems Laboratories, Inc.
kV	kilovolt
LBS	leakage boundary (spatial)
LER	license event report
LOCA	loss of coolant accident
LPCI	low pressure coolant injection
LRA	license renewal application
LRT	leak rate test
MIC	microbiologically influenced corrosion
MSIV	main steam isolation valve
NDE	non-destructive examinations

NEI	Nuclear Energy Institute
NEIL	Nuclear Electric Insurance Limited
NER	Nuclear Engineering Report
NFPA	National Fire Protection Association
NMCA	noble metals chemical addition
NMP	Nine Mile Point
NMPNS	Nine Mile Point Nuclear Station
NPS	nominal pipe size
NRC	Nuclear Regulatory Commission
NRR	NRC's Office of Nuclear Reactor Regulation
NSR	non-safety related
NUMARC	Nuclear Management and Resources Council (now NEI)
NWC	normal water chemistry
OCCWS	open-cycle cooling water system
ODSCC	outer diameter stress corrosion cracking
OE	operating experience
PB	pressure boundary
PBD	program basis document
PM	preventive maintenance
PQE	plant qualification evaluation
PRM	power range monitoring
PT	penetrant testing
PTS	pressurized thermal shock
PWR	pressurized water reactor
PWSCC	primary water stress corrosion cracking
RAI	request for additional information
RBCLC	reactor building closed loop cooling
RCPB	reactor coolant pressure boundary
RCS	reactor coolant system
RG	regulatory guide
RHS	residual heat removal
RI-ISI	risk informed - inservice inspection
RLEP-B	NRC's License Renewal and Environmental Impacts Program, Section B
RPV	reactor pressure vessel
RWCU	reactor water cleanup
SBO	station blackout
SC	structures and components
SCC	stress corrosion cracking
SER	safety evaluation report
SFS	structural/functional support
SIA	structural integrity attached
SIL	service information letter

SNSR	structural support for non-safety related
SOER	significant operating experience report
SOV	solenoid operated valve
SP	shelter/protection
SRP-LR	Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants
SRV	safety relief valve
SS	stainless steel
SSC	systems, structures, and components
SW	service water
TLAA	time-limited aging analysis
TR	topical report
UFSAR	Updated Final Safety Analysis Report
UHS	ultimate heat sink
USAR	Updated Safety Analysis Report
UT	ultrasonic testing

Nine Mile Point Audit and Review Report

Attachment 2

Project Team and Applicant Personnel

NMP Units 1 and 2 Audit and Review Project Team

Ken Chang, NRC, Team Leader*
Robert Hsu, NRC, Backup Team Leader
Mike Kennedy, ISL, ISL Lead
Malcolm Patterson, ISL
Jon Woodfield, ISL
Peter Wen, NRC
Tommy Le, NRC
Duc Nguyen, NRC
Q. Gan, NRC

Project Team Support

Jacob Zimmerman, Chief, NRC RLEP Section B*
Tommy Le, NRC RLEP Project Manager*
Colleen Amoruso, ISL Administrative Support
Tammy Pfiester, ISL Administrative Support

Applicant Personnel Contacted

S. Agrawal
E. Anderson
K. Anstee
M. Armenta
G. Bailey
M. Becker
J. Blasiak
C. Brown
W. Carter
M. Chambers
T. Childress
P. Collins
N. Conicella
D. Dellario
E. Dunn
M. Faivus
M. Fallin
P. File
P. Finnerty
L. Fletcher
D. Goodney
R. Green
K. Haws
W. Holston
S. Houston
J. Hutton
G. Inch
P. Kehoe
D. Kunsemiller
M. Lane
S. Leonard
J. Lyon
P. Mazaferro
G. Perkins
J. Poehler
J. Raby
B. Shanahan
C. Senska
A. Sterio
J. Wadsworth

*Attended the Public Exit Meeting on November 18, 2005.

Nine Mile Point Audit and Review Report

Members of the Public Who Attended the Public Exit Meeting on November 18, 2005

L. Martiniano
R. Plasse
T. Herrmann

Nine Mile Point Audit and Review Report

Attachment 3

Element of an Aging Management Program for License Renewal

1	Scope of program	Scope of program should include the specific structures and components subject to an AMR for license renewal.
2	Preventive actions	Preventive actions should prevent or mitigate aging degradation.
3	Parameters monitored or inspected	Parameters monitored or inspected should be linked to the degradation of the particular structure or component intended function(s).
4	Detection of aging effects	Detection of aging effects should occur before there is a loss of structure or component intended function(s). 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 predictability of the extent of degradation, 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 structure or component intended function(s) are maintained under all CLB 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	Confirmation process should ensure that preventive actions are adequate and that 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 of the aging management program, including past corrective actions resulting in program enhancements or additional programs, 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.

Nine Mile Point Audit and Review Report

Attachment 4

Disposition of Requests for Additional Information, ALRA Supplements, and Open Items

Requests for Additional Information

RAI Number	Audit and Review Report Section	Description
RAI 3.4.1.A-1	3.4A.1.3	In the NMP ALRA Table 3.4.1.A, Items 3.4.1.A-09 and 3.4.1.A-10, the applicant stated that these items are not applicable because “All other heat exchangers are of a different material (copper alloys or stainless steel) and do not have this aging effect/mechanism.” However, both copper alloy and stainless steel are subjected to the aging effect of pitting and crevice corrosion. The project team requested the applicant to clarify why both items are not applicable for NMP Unit 1.

ALRA Supplements

In a letter dated December 1, 2005, the applicant submitted an ALRA Supplement in response to on-site audits of the aging management programs and management reviews. This ALRA Supplement provides disposition for all docketed audit findings and addresses future commitments, as stated in Attachment 6 of this audit and review report.

Open Items

Open Item No.	Description	Closed to RAI (RAI Issue)
None	N/A	N/A

Attachment 5

List of Documents Reviewed

The following is a list of applicant documents reviewed by the project team, including documents prepared by others for the applicant. Inclusion of a document on this list does not imply that the project team reviewed the entire document, but, rather that selected sections or portions of the documents were reviewed as part of the overall effort documented in this audit and review report. In addition, inclusion of a document in this list does not imply NRC acceptance of the document.

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
ASME Section XI Inservice Inspection (Subsections IWB, IWC, IWD) Program (B2.1.1)	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD, XI.M1	NMP Technical Report, LR-PBD-IWBCD, "ASME Section XI Inservice Inspection, Subsections IWB IWC, and IWD (Units 1 and 2)," Revision 0, 9/9/2005 Program Attribute Assessment: NMP Unit 1 and Unit 2 ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD, Revision 1 NMP2-ISI-006, "Second Inservice Inspection Interval," Revision 03, 12/7/2001 NMP1-ISI-003, "Ten-Year Inservice Inspection Plan and Schedule," Revision 03, 12/5/2003 NMP1-RI-ISI-003, "Alternative Risk-Informed Inservice Inspection Plan and Schedule," Revision 01, 12/4/2003 NMP2-RI-ISI-006, "Alternative Risk-Informed Inservice Inspection Plan and Schedule," Revision 00, 12/5/2003
Water Chemistry Control Program (B2.1.2)	Water Chemistry, XI.M2	NMP Technical Report, LR-PBD-WCHEM, "Water Chemistry (Units 1 and 2)," Revision 0, 9/14/2005 NMP Unit 1 Water Chemistry Program Attribute Assessment, Revision 1, 7/15/2004 NMP Unit 2 Water Chemistry Program Attribute Assessment, Revision 1, 7/15/2004 Letter from U.S. Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated October 5, 2000, Subject: Nine Mile Point Nuclear Station, Unit 1 – Reliefs for the Third 10-Year Inservice Inspection Program Plan, Revision 1 (TAC No. MA7129)

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		Letter from U.S. Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated March 3, 2000, Subject: Nine Mile Point Nuclear Station, Unit 2 – Reliefs for the Second 10-Year Inservice Inspection Program Plan, Revision 1 (TAC No. MA6273) Letter from U.S. Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated September 18, 1998, Subject: Issuance of Amendment for Nine Mile Point Nuclear Station Unit No. 1 (TAC No. M99130) Letter from U.S. Nuclear Regulatory Commission to Exelon Corporation dated September 13, 2002, Subject: License Renewal Safety Evaluation Report with Open and Confirmatory Items for the Peach Bottom Atomic Power Station, Units 2 and 3 N2-CSP-GEN-D100, "Reactor Water/Auxiliary Water Chemistry Surveillance," Revision 04, 12/2/2000 N2-CTP-GEN-M105, "Monthly Reactor Water, SFC, and Suppression Pool Chemistry," Revision 00, 3/22/1993 N2-CTP-GEN-W104, "Miscellaneous Reactor Building Chemistry Surveillance," Revision 02, 6/24/1996 N2-CTP-GEN-M922, "Chemistry Surveillance for Auxiliary Water Systems," Revision 01, 1/7/2004 10CFR54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants"

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		Unit 1 Final Safety Analysis Report (FSAR), Revision 18, 10/2003 GAP-CHE-01, "BWR Water Chemistry Operating Limits," Revision 8, 1/2/2003 GAP-CHE-03, "BWR Vessel Internals Program (BWRVIP) Mitigation System Operating Limits and Goals," Revision 01, 8/8/2003 EPRI TR-103515-R1BWRVIP-29, "BWR Water Chemistry Guidelines-1996 Revision," 12/1996 N1-CAD-CHE-0104, "NMP 1 Chemistry Self-Assessment Program," Revision 01, 1/2/2003 S-CIP-V666, Revision 00, "Auxiliary System Chemistry," 1/7/2004 S-CAD-CHE-0101, "Chemistry Sampling Conduct," Revision 04, 7/15/2003 NI-CTP-V600, "Sampling Plant Systems," Revision 06, 12/31/2002
Reactor Head Closure Studs Program (B2.1.3)	Reactor Head Closure Studs, XI.M3	NMP Technical Report, LR-PBD-HDSTUDS, "Reactor Head Closure Studs Program," Revision 1, 9/7/2005 Product Data Sheet, Dag 156 Dry Film Graphite Lubricant, 13-108-RV896 Letter from U.S. Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated October 5, 2000, Subject: Nine Mile Point Nuclear Station, Unit No. 1 – Reliefs for the Third 10-Year Inservice Inspection Program Plan, Revision 1 (TAC No. MA7129)

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		Letter from U.S. Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated March 3, 2000, Subject: Nine Mile Point Nuclear Station, Unit No. 2 – Reliefs for the Second 10-Year Inservice Inspection Program Plan, Revision 1 (TAC No. MA6273) Regulatory Guide 1.65, "Materials And Inspections For Reactor Vessel Closure Studs," 10/1973 NDEP-UT-6.25, Revision 03, "Straight Beam Ultrasonic Examination of Bolts and Studs," 9/27/2002 NDEPT-MT-4.00, Revision 14, "Magnetic Particle Examination," 2/4/2004
BWR Vessel ID Attachment Welds Program (B2.1.4)	BWR Vessel ID Attachment Welds, XI.M4	NMP Technical Report, LR-PBD-VIDWELDS, "BWR Vessel ID Attachment Welds Program (Units 1 and 2)," Revision 0, 9/15/2005 Program Attribute Assessment: NMP Unit 1 and 2 Reactor Vessel Internals Program, Revision 0, 2/2/2004 NER-2M-074, "BWR Vessel and Internals Project (BWRVIP) Core Spray Internals Inspections and Evaluation(s) (BWRVIP-18 and BWRVIP-48)," Revision 00, 5/13/2003 NER-1M-078, "Vessel ID Attachment Weld Inspection and Evaluation," Revision 1 NER-2M-084, Revision 0 "BWR Vessel and Internals Project, Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines (BWRVIP-48)," "EPRI Topical Report TR-108724," "Final License Renewal Safety Evaluation Report By the Office of NRR for BWPVIP-48 for

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		Compliance with the License Renewal Rule (10CFR 54.21)," 1/17/2001
BWR Feedwater Nozzle Program (B2.1.5)	BWR Feedwater Nozzle, XI.M5	NMP Technical Report, LR-PBD-FWNZL, "BWR Feedwater Nozzle," Revision 0, 9/7/2005 NUREG-0619, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking: Resolution of Generic Technical Activity A-10," Revision 1, 11/1980 GE-NE-523-A71-0594-A, Revision 1, DRF 137-0010-7 Class II, 5/2000 Letter from Mr. Richard B. Abbott (NMPNS) to U.S. Nuclear Regulatory Commission, dated December 13, 1999, (NMP1L 1489), Subject "NUREG-0619 Inspection Reporting for NMP1 RPV Feedwater and CRDRL Nozzle Examinations – 1999 Refueling Outage (RF015)" MPR-1484, Revision 1, "Feedwater Nozzle Fatigue Evaluation," 3/1999 NDEP-UT-6.25, Revision 03, "Straight Beam Ultrasonic Examination of Bolts and Studs," 9/27/2002 NDEPT-MT-4.00, Revision 14, "Magnetic Particle Examination," 2/4/2004
BWR Stress Corrosion Cracking Program (B2.1.6)	BWR Stress Corrosion Cracking, XI.M7	NMP Technical Report, LR-PBD-SCC, "BWR Stress Corrosion Cracking (Units 1 and 2)," Revision 0, 9/7/2005 NMP Unit 1 and 2 BWR Stress Corrosion Cracking Program Attribute Assessment, Revision 1, 8/5/2004 NMP2-ISI-006, "Second Inservice Inspection Interval," Revision 03, 12/7/2001

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		NMP1-ISI-003, "Ten-Year Inservice Inspection Plan and Schedule," Revision 03, 12/5/2003 NMP1-RI-ISI-003, "Alternative Risk-Informed Inservice Inspection Plan and Schedule," Revision 01, 12/4/2003 NMP2-RI-ISI-006, "Alternative Risk-Informed Inservice Inspection Plan and Schedule," Revision 00, 12/5/2003
BWR Penetrations Program (B2.1.7)	BWR Penetrations, XI.M8	NMP Technical Report, LR-PBD-VSSLPENS, "BWR Penetrations (Units 1 and 2)," Revision 0, 9/15/2005 Program Attribute Assessment: NMP Unit 1 and 2 Reactor Vessel Internals Program, Revision 0, 2/2/2004 BWR Vessel and Internals Project, BWR Standby Liquid Control System/Core Plant Delta P Inspection and Flaw Evaluation Guidelines (BWRVIP-27), Final License Renewal Safety Evaluation Report by the Office of NRR for BWPVIP-27 for Compliance with the License Renewal Rule (10 CFR Part 54), 12/20/1999 BWR Vessel and Internals Project, Instrument Penetration Inspection and Flaw Evaluation Guidelines (BWRVIP-49), Final License Renewal Safety Evaluation Report by the Office of NRR for BWPVIP-49 for Compliance with the License Renewal Rule (10 CFR Part 54), 9/1/1999
BWR Vessel Internals Program (B2.1.8)	BWR Vessel Internals, XI.M9	NMP Technical Report, LR-PBD-RVI, "BWR Vessel Internals (Units 1 and 2)," Revision 0, 9/15/2005 Program Attribute Assessment: NMP Unit 1 and 2 Reactor Vessel Internals Program, Revision 0, 2/2/2004

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		BWR Vessel and Internals Project, BWR Standby Liquid Control System/Core Plant Delta P Inspection and Flaw Evaluation Guidelines (BWRVIP-27), Final License Renewal Safety Evaluation Report by the Office of NRR for BWPVIP-27 for Compliance with the License Renewal Rule (10 CFR Part 54), 12/20/1999 BWR Vessel and Internals Project, Instrument Penetration Inspection and Flaw Evaluation Guidelines (BWRVIP-49), Final License Renewal Safety Evaluation Report by the Office of NRR for BWPVIP-49 for Compliance with the License Renewal Rule (10 CFR Part 54), 9/1/1999 Letter from Peter S. Tam, NRC to Mr. John H. Mueller, NMPC, dated April 27, 2000 re: "Nine Mile Point Nuclear Station, Unit No. 2" Core Shroud Reinspection Plan for Refueling Outage 7 (TAC No. MA7284) Letter from Peter S. Tam, NRC to Mr. John H. Mueller, NMPC, dated October 30, 2000 re: "Nine Mile Point Nuclear Station, Unit No. 2" Safety Evaluation of Core Shroud Inspection Results (TAC No. 9057) NMP2L 1961, Letter from Richard B. Abbott, NMPC to USRNRC, dated April 28, 2000, re: "Core Shroud Reinspection Results (TAC No. MA7284)" NMP2L 2029, Letter from Richard B. Abbott, NMPC to USNRC dated September 14, 2001, re: "Reinspection Plan for Core Shroud Weld H4" NER-1M-080, "Miscellaneous Non-Safety Related Vessel Internal Inspection and Evaluation"

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
Flow Accelerated Corrosion Program (B2.1.9)	Flow-Accelerated Corrosion, XI.M17	"Program Attribute Assessment: Unit 1 Flow Accelerated Corrosion Program and Unit 2 Flow Accelerated Corrosion Program" ECPR-N1-HE-001, "NMP Unit 1 Carbon Steel and Low Alloy Piping Systems High Energy Erosion Corrosion (E/C) Review Program," Revision 0 ECPR-N1-HE-001, "NMP Unit 1 Carbon Steel and Low Alloy Piping Systems High Energy Erosion Corrosion (E/C) Review Program," Revision 0 ECPN-N1-HE-001, "NMP Unit 1 Erosion Corrosion Program Carbon Steel Piping Review Program High Energy Systems," Revision 5 ECPR-N2-HE-003, "NMP Unit 2 Carbon Steel and Low Alloy Piping Systems Erosion Corrosion (E/C) Review Program," Revision 0 ECPN-2002, "NMP Unit 2 Flow Accelerated Corrosion Program Carbon Steel Piping Review High Energy Systems," Revision 8
Open Cycle Cooling Water System Program (B2.1.10)	Open-Cycle Cooling Water System, XI.M20	NMP Technical Report, LR-PBD-U1OCCW, "Open-Cycle Cooling Water System (Unit 1)," Revision 0, 9/14/2005 NMP Technical Report, LR-PBD-U2OCCW, "Open-Cycle Cooling Water System (Unit 2)," Revision 0, 9/14/2005 NMP Unit 1 Open Cycle Cooling Water Program Attribute Assessment, Revision 00, Jeff Poehler, 2/2/2004 ECPR-N1-SWP-001, "Nine Mile Point Unit 1 Service Water Systems Erosion Corrosion Review Program," Revision 0, 1/23/1992

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		S-CTP-V623, "Sampling and Analysis of Water Systems for Bacteria," Revision 1, 8/22/2003 N1-CTP-935, "Operation of the Service Water Chemical Injection Skid," Revision 5, 7/1/2002 N1-CTP-V945, "Service Water Zebra Mussel Treatment," Revision 07, 6/15/2000 N1-MPM-070-409, "RBCLC Water Heat Exchangers 70-13R, 70-14R, 70-15R," Revision 2, 11/1/2000 N1-MPM-070-412, "Diesel Generator Cooling Water Heat Exchangers and Temperature Control Valve Maintenance," Revision 2, 9/15/2000 N1-TTP-033, "Reactor Building Closed Loop Cooling Heat Exchanger Performance Test," Revision 2, 9/23/1994 NMP1L 0553, Letter from C.D. Terry (NMP1) to NRC, 12/10/1990, transmitting attachment titled "Revised Response to Generic Letter 89-13" N1-ST-Q16A, "Emergency Diesel Generator 102 Quarterly Test," Revision 00, 9/4/2002 and N1-ST-Q16B, "Emergency Diesel Generator 103 Quarterly Test," Revision 00 Letter from NRC to Ralph P. Sylvia dated February 25, 1991, re: NRC Generic Letter (GL) 89-13, "Service Water System Problems Affecting Safety Related Equipment," 7/18/1989 (TAC Nos. 74029 and 74030) NMP Unit 2 Open-Cycle Cooling Water System Program, Revision 0, Jeff Poehler, 1/20/2004

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		S-CTP-V632, "Sampling, and Analysis of Water Systems for Bacteria," Revision 01, 8/22/2003 ECPR-N2-SWP-001, "Service Water System Erosion Corrosion Piping Review Program," Revision 0, 8/30/1990 N2-MPM-RHS-6Y410, "Residual Heat Removal Heat Exchanger PM," Revision 1, 12/20/2000 N2-TTP-HVP-001, "Performance Evaluation Test for Diesel Generator Coolers," Revision 05, 9/28/2001 NMP2L 1265, Letter from C.D. Terry (NMP2) to NRC, 12/10/1990, transmitting attachment titled "Revised Response to Generic Letter 89-13" GAP-HSC-02, "System Cleanliness Controls," Revision 12, 10/2/2003
Closed-Cycle Cooling Water System Program (B2.1.11)	Closed-Cycle Cooling Water System, XI.M21	NMP Technical Report, LR-PBD-U1CCCW, "Closed-Cycle Cooling Water System (Unit 1)," Revision 0, 9/14/2005 NMP Technical Report, LR-PBD-U2CCCW, "Closed-Cycle Cooling Water System (Unit 2)," Revision 0, 9/14/2005 NMP Unit 1 Closed-Cycle Cooling Water Program Attribute Assessment, Revision 1, 7/15/2004 EPRI TR-107396, "Closed Cooling Water Chemistry Guideline," 10/1997 S-CTP-V666, "Auxiliary System Chemistry," Revision 01, 3/3/2004

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		N1-MPM-070-409, "RBCLC Heat Exchangers 70-13R, 70-14R, 70-15R," Revision 02, 11/1/2000 N1-TTP-033, "Reactor Building Closed Loop Cooling Heat Exchanger," Revision 02, 9/23/1994 N1-ST-Q19, "Control Room HVAC System Operability Test," Revision 06, 7/23/2003 N1-ST-Q14, "Reactor Building Closed Loop Cooling System Pump and Valve Operability Test," Revision 03, 8/30/1994 N1-CTP-Q550, "Diesel Jacket Cooling Water Sampling and Analysis," Revision 01, 1/7/2003 N1-ST-Q16A, "Emergency Diesel Generator 102 Quarterly Test," Revision 00, 9/4/2002, and N1-ST-Q16B, "Emergency Diesel Generator 103 Quarterly Test," Revision 00 N1-MPM-079-412, "Diesel Generator Cooling Water Heat Exchanger and Temperature Control Valve Maintenance," Revision 02, 9/15/2000 NMP Unit 2 Closed-Cycle Cooling Water Program Attribute Assessment, Revision 1, S. Petras, 7/15/2004 N2-OSP-EGS-R001, "Diesel Generator ECCS Start Division ½," Revision 03, 12/2/2000 N2-CTP-GEN-M922, "Chemistry Surveillance for Auxiliary Water Systems," Revision 01, 1/7/2004

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		N2-MMP-HVK-127, "Maintenance of Chill Water Pumps (2HVK*P1A and 2HVK*P1B)," Revision 04, 2/27/2002 N2-MMP-HVK-V557, "Control Building Chillers (2HVK*CHL1A)" N2-TSP-HVK-2Y001, "Performance Evaluation Test for Control Room Chiller (2HVK*CHL1A)," Revision 02, 7/18/2002 N2-CTP-EGS-M521, "Diesel Jacket Cooling Water Chemical Surveillance," Revision 02, 11/26/1997 N2-OSP-ESG- M001, "Diesel Generator And Diesel Air Start Valve Operability Test - Division I and II," Revision 04, 6/13/2003 S-CTP-V666, "Auxiliary System Chemistry," Revision 00, 1/7/2004
Boraflex Monitoring Program (B2.1.12)	Boraflex Monitoring, XI.M22	NMP Technical Report, LR-PBD-BORAFLEX, "Boraflex Monitoring (Unit 1 only)," Revision 0, 9/8/2005 NMP-AMP BFX01, Rev 0, "NMP1 Program Plan for Spent Fuel Rack Boraflex Degradation Monitoring Program" N1-FHP-48, Rev 6, "Boraflex Coupon Retrieval and Surveillance Program" S-CTP-V666, Rev 1, "Auxiliary System Chemistry" OT-EDS-028, "Racklife Model Maintenance/ Application" OT-EDS-xx, "Implementation of In-Situ B-10 Areal Density Testing, Measurement of Gap Formation and Use of Results to Validate Racklife and Coupon Program at NMP1"

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		OT-EDS-YY, "Trending of Spent Fuel Pool Silica Data, Boraflex Coupon Evaluation Results and In-Situ B-10 Areal Density Testing Results at NMP1"
Inspection of Overhead Heavy Load and Light Load Handling Systems Program (B2.1.13)	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems, XI.M23	NMP Technical Report, LR-PBD-OHLOAD, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (Units 1 and 2)," Revision 0, 9/12/2005 LRG-08, Units 1 and 2 Inspection of Overhead Heavy Load and Light Load Handling Systems Program Attribute Assessment, Revision 0, 1/13/2004 N1-MMP-GEN-914, "Lifting of Miscellaneous Heavy Loads," Revision 3, 11/17/2000 N2-MMP-GEN-923, "Lifting of Miscellaneous and Specific Heavy Loads in Designated Areas," Revision 7, 5/4/1998 N2-MPM-GEN-V809, "Station Crane and Hoist P.M.," Revision 05, 9/3/2003 N2-PM-S001, "Refueling Platform and Grapple Inspection," Revision 00, 4/15/1993 N2-MPM-MHR-R801, "Reactor Building Polar Crane P.M.," Revision 1, 9/4/2002 N1-MRM-REL-0104, "NMP1 Maintenance Rule Scope," Revision 18, 9/30/2003 N2-MRM-REL-0104, "NMP2 Maintenance Rule Scope," Revision 15, 8/1/2003
Compressed Air Monitoring Program (NMP Unit 1 only) (B2.1.14)	Compressed Air Monitoring, XI.M24	NMP Technical Report, LR-PBD-COMPAIR, "Compressed Air Monitoring (Unit 1 only)," Revision 0, 9/13/2005 N1-ST-Q21 Instrument Air Valves Quarterly Operability Test

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		N1-MPM-094-604 Instrument Air Compressor PM CMPR-94-01 and CMPR-94-02 N1-MPM-094-020 Instrument Air Dryer DEH-94-168 and DEH-94-169 Cleaning and Inspection N1-MPM-094-601 Maintenance of Instrument Air Compressor CMPR-94-01 and CMPR-94-02 N1-SOP-20.1 Instrument Air Failure N1-CTP-Q921 Instrument Air Sampling and Analysis
BWR Reactor Water Cleanup System Program (B2.1.15)	BWR Reactor Water Cleanup System, XI.M25	NMP Technical Report, LR-PBD-RWCU, "BWR Reactor Water Cleanup System (Unit 1 Only)," Revision 0, 9/7/2005 NMP Unit 1 and 2 Reactor Water Cleanup System (GALL XI.M25) Program Attribute Assessment, Revision 1, 8/5/2004 10CFR54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants" "Nine Mile Point Nuclear Station Unit 2 Updated (Final) Safety Analysis Report (UFSAR)," Revision 15, 10/2002 "Nine Mile Point Nuclear Station Unit 1 Final Safety Analysis Report (FSAR) (Updated)," Revision 18, 10/2003 Letter from Niagara Mohawk to the NRC, "Generic Letter 88-01," 11/10/1988 Letter from Niagara Mohawk to the NRC, "Inservice Inspection and Testing," 10/19/1988

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		Letter from U.S. Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated October 5, 2000, Subject: Nine Mile Point Nuclear Station, Unit 1 – Reliefs for the Third 10-Year Inservice Inspection Program Plan, Revision 1 (TAC No. MA7129) Letter from U.S. Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated March 3, 2000, Subject: Nine Mile Point Nuclear Station, Unit 2 – Reliefs for the Second 10-Year Inservice Inspection Program Plan, Revision 1 (TAC No. MA6273)
Fire Protection Program (B2.1.16)	Fire Protection, XI.M26	NMP Technical Report, LR-PBD-FIREPRO, "Fire Protection," Revision 0, 9/12/2005 N1-FST-FPP-C001, "Fire Barrier/Penetration Sealing Inspection," Revision 06, 6/5/2001 N1-FST-FPP-D002, "Daily Fire Door Inspection," Revision 00, 3/14/2001 N1-PM-C3, "Electric and Diesel Fire Pump Performance Tests," Revision 05, 8/29/2003 N2-FSP-FPP-D002, "Daily Fire Door Inspection," Revision 00, 3/14/2001 N2-FSP-FPP-R001, "Fire Rated Assemblies and Watertight Penetration Visual Inspection," Revision 03, 12/7/2000 N2-FSP-FPW-R001, "Electric/Diesel Fire Pump Functional Test," Revision 6, 10/23/2003 N2-FPM-FPL-A002, "CO2 Hose Reel Visual Inspection and System Operability Test," Revision 04, 2/20/1998

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		N2-OSP-FOF-W001, "Engine Driven Fire Pump Operability & Storage Tank Level Test," Revision 03, 1/22/2003 NMP2-S208A, Section 6.0, Inspection and Testing, Non-Safety Related Fire Doors Inspection, Revision 3
Fire Water System Program (B2.1.17)	Fire Water System, XI.M27	NMP Technical Report, LR-PBD-FIREWATER, "Fire Water," Revision 0, 9/12/2005 N1-FPM-FPF-C001, "Sprinkler Valve Functional Test: Foam/Water," Revision 7, 4/27/2001 N1-FPM-FPW-C001, "Fire Hose Hydrostatic Test," Revision 4, 6/13/2001 N1-FPM-FPW-C004, "Deluge System Functional Test Main Transformer T-2," Revision 5, 6/8/2001 N1-FPM-FPW-C005, "Sprinkler Valve Functional Test," Revision 00, 4/6/2001 N1-FST-FPE-A001, "Fire Protection Equipment Annual Inspection," Revision 00, 11/15/2001 N1-FST-FPW-3A001, "FPW System Flow Test," Revision 04, 2/14/2000 N1-FST-FPW-A008, "Hose Station Valve Operability Test," Revision 05, 5/1/2001 N1-FST-FPW-C003, "Fire Protection Preaction, Deluge and Automatic Sprinkler Test," Revision 02, 5/24/2001 N2-FPM-FPW-A002, "BOP Hose Station Valve Operability Test," Revision 03, 5/18/2001

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		N2-FPM-FPW-R004, "Fire Protection Deluge Valve and Sprinkler System Functional Test - Feedwater Pumps 2FWS-P1A, 2FWS-P1B, 2FWS-P1C," Revision 02, 1/15/1998 N2-FSP-FPW-3A002, "Fire Hose Hydrostatic Test," Revision 04, 8/26/2002 N2-FSP-FPW-A002, "Hose Station Valve Operability Test," Revision 04, 5/18/2001 N2-FSP-FPW-R001, "Electric/Diesel Fire Pump Functional Test," Revision 06, 10/23/2003 N1-PM-C3, "Electric and Diesel Fire Pump Performance Tests," Revision 05, 8/29/2003
Fuel Oil Chemistry Program (B2.1.18)	Fuel Oil Chemistry, XI.M30	NMP Technical Report, LR-PBD-U1FOCHEM, "Fuel Oil Chemistry (Unit 1)," Revision 0, 9/14/2005 NMP Technical Report, LR-PBD-U2FOCHEM, "Fuel Oil Chemistry (Unit 2)," Revision 0, 9/14/2005 NMP Unit 1 License Renewal Fuel Oil Chemistry Program Attribute Assessment, Revision 0, 1/24/2004 10CFR54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," Nine Mile Point Nuclear Station Unit 1 Final Safety Analysis Report (FSAR) N1-CTP-M500, "Monthly Diesel Fuel Oil Sampling and Analysis," Revision 02, 12/12/1996 N1-CTP-V502, "Incoming Diesel Fuel," Revision 05, 2/7/2003

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		N1-CSP-Q504, "Quarterly Fuel Oil Sampling and Analysis," Revision 03 N1-MPM-EFG-10Y001, "Diesel Generator Fuel Oil Storage Tank Cleaning," Revision 01, 10/22/2001 S-CAP-93, "Water and Sediment Determination," Revision 00, 12/3/1996 S-CAP-97, "Particulate Contamination Determination of Diesel Fuel Oil Lab Filtration Method," Revision 00, 3/13/1996 NMP Unit 2 License Renewal Fuel Oil Chemistry Program Attribute Assessment, Revision 0, 1/27/2004 N2-CSP-EDG-M500, "Emergency Diesel Fuel Monthly Particulate Surveillance," Revision 00, 12/21/1992 N2-CSP-EDG-A501, "Incoming Diesel Fuel," Revision 03, 3/15/1996 N2-CTP-FPW-Q502, "Fire Diesel Quarterly Fuel Oil Surveillance," Revision 00, 12/21/1992 N2-CSP-EDG-A503, "Emergency Diesel Generator Furl Preservative Surveillance," Revision 00, 12/21/1992 N2-MPM-EGF-10Y001, "Diesel Generator Fuel Oil Storage Tank Cleaning," Revision 01, 10/25/2001
Reactor Vessel Surveillance Program (B2.1.19)	Reactor Vessel Surveillance, XI.M31	**Assigned to DE**
One-Time Inspection Program (B2.1.20)	One-Time Inspection, XI.M32	NMP Technical Report, LR-PBD-OTINSP, "One-Time Inspection," Revision 0, 9/9/2005

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		ASME Boiler And Pressure Vessel Code, 3/28/2000, Case N-578-1, Risk-Informed Requirements for Class 1, 2, or 3 Piping, Method B, Section XI, Division 1
Selective Leaching of Materials (B2.1.21) Program	Selective Leaching of Materials, XI.M33	NMP Technical Report, LR-PBD-SLEACH, "Selective Leaching of Materials," Revision 0, 9/12/2005
Buried Piping and Tanks Inspection Program (B2.1.22)	Buried Piping and Tanks Inspection, XI.M34	NMP Technical Report, LR-PBD-BURIED, "Buried Piping and Tanks Inspection Program (Units 1 and 2)," Revision 0, 9/9/2005 NMP1 and NMP2 License Renewal Buried Piping Tanks Program Attribute Assessment, Revision 1, 8/10/2004 NIP-IIT-01, "ASME Section XI Activities," Revision 14, 7/14/2003 PSRS-100.3, Piping Specification Record Set, Fire Protection – Water (Underground), Niagara Mohawk Power Corporation Nine Mile Point Nuclear Station Unit No. 1 PSRS-103.2, Piping Specification Record Set, City Water (Potable) Service (Underground), Niagara Mohawk Power Corporation Nine Mile Point Nuclear Station Unit No. 1 NMP2-P301A, Pipe Classes 2 and 2A, Piping Engineering and Design ASME III, Code Class 1, 2, and 3 and ANSI B31.1, Revision 2, 11/24/1986 PSRS-82, Piping Specification Record Set, Fuel Oil Handling and Storage, Niagara Mohawk Power Corporation Nine Mile Point Nuclear Station Unit No. 1

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		Drawing F-42188C, Sheet 1, Emergency Diesel Fuel Oil Tanks Conduit and Piping Plan, Revision 5 Drawing C-15431-C, Sheet 1 of 2, Emergency Diesel Fuel Oil Storage & Handling, Revision 3 Drawing 12177-EC-58BH-3, Foundation Sections & Details – Diesel Generator Bldg., Revision 3 "Nine Mile Point Nuclear Station Unit 1 Final Safety Analysis Report (FSAR) (Updated)," Revision 18, 10/2003 "Nine Mile Point Nuclear Station Unit 2 Updated Safety Analysis Report (USAR)," Revision 15, 10/2002 DER NM-2001-1888, Excessive System Leakage From U2 Fire System, 4/29/2001 DER NM-2002-4223, Loose T-Bolts on Flange Connection on Underground Fire Protection System Piping, 9/27/2002 NIP-VIP-01, Vessel and Internals Program (VIP) Administration, Revision 01, 8/13/2003 DER NM-1991-623 – Closed, "Cracks In PR340 Floor to RB 318 Ceiling" DER NM-1992-114 – Closed, "Cracked Concrete" DER NM-1993-1789 – Closed, "Masonry Wall Monitoring Walkdown Per Engineering Spec. SDS-001" DER NM-1994-173 – Closed, "Cracking in South Wall of Reactor Building on Elevations 281, 298, 318 Columns 6 & 9"

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		DER NM-1994-174 – Closed, "Numerous Vertical Cracks in Concrete Turbine Building Wall on North Side Between Columns 7 & 11" DER NM-1997-1944 – Closed, "Structural Maintenance Rule Walkdown Deficiencies (MR)" DER NM-1997-3392 – Closed, "Structural Maintenance Rule Walkdown Deficiencies (MR)" DER NM-1996-1951 – Closed, "Cracking/Shifting Wall" DER NM-1994-376 – Closed, "Groundwater Inleakage to TB Pipe Tunnel" DER NM-1998-159 – Closed, "Groundwater Inleakage into Turbine Bldg. SWP Tunnel Through New Cracks"
ASME Section XI ISI (Subsection IWE) Program (B2.1.23)	ASME Section XI, Subsection IWE, XI.S1	NMP Technical Report, LR-PBD-IWE, "ASME Section XI, Subsection IWE (Units 1 and 2)," Revision 2, 9/20/2005 NMP Technical Report, LR-PBD-IWE, "ASME Section XI, Subsection IWE (Units 1 and 2)," Revision 1, 9/7/2005 LRG-08, Work Product Review Guideline, NMP1 ASME Section XI ISI, Subsection IWE (GALL XI.S1) Program Attribute Assessment, Revision 1, 8/5/2004 LRG-08, Work Product Review Guideline, NMP2 ASME Section XI ISI, Subsection IWE (GALL XI.S1) Program Attribute Assessment, Revision 1, 8/5/2004 NIP-IIT-01, "ASME Section XI Activities," Revision 14, 7/14/2003

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		QAP-TQS-2.61, "Qualifications of Nondestructive Examination Personnel," Revision 10, 7/29/2003 NDEP-VT-2.05, "ASME Section XI IWE/IWL Visual Examination," Revision 3, 1/17/2003 DER-NM-1999-1846, "QI-Excessive Corrosion & Build-Up In Drywell Dome Seal Area" DER-NM-1999-1449, "QI-Torus Hatch XS311 Flange Gouges" DER-NM-2001-1013, "QI: Damaged Seal Surface On Drywell Dome" DER-NM-1999-1837, "QI-Damage Seal Surface on Drywell Dome" DER-NM-2003-1080, "Drywell Liner has areas of major rust at 225' elevation under area coolers" Letter from U.S. Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated August 17, 2000, Subject: Nine Mile Point Nuclear Station, Unit Nos. 1 and 2 – Relief from the Requirements of 10CFR50.55a Related to Containment Inspection (TAC Nos. MA7116, MA7117, and MA7118) NMP2-CISI-006, "First Containment Inservice Inspection Program Plan," Revision 1, 6/25/2004 DER-NM-2000-963, "Corrosion of Drywell Liner"

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
ASME Section XI Inservice Inspection (Subsection IWL) (B2.1.24)	ASME Section XI, Subsection IWL, XI.S2	NMP Technical Report, LR-PBD-IWL, "ASME Section XI, Subsection IWL (Unit 2)," Revision 2, 9/20/2005 LRG-08, NMP2 ASME Section XI ISI, Subsection IWL (GALL X1.52) Program Attribute Assessment, Revision 1, 8/5/2004 NMP2-CISI-001, "Containment Inservice Inspection Criteria for Nine Mile Point Nuclear Station – Unit 2," Revision 00, 2/25/2000 NMP2-CISI-006, "First Containment Inservice Inspection Program Plan," Revision 00, 2/28/2000 NIP-IIT-01, "ASME Section XI Activities," Revision 14, 7/14/2003 QAP-TQS-2.61, "Qualification of Nondestructive Examination Personnel," Revision 10, 7/29/2002 NDEP-VT-2.05, "ASME Section XI IWE/IWL Visual Examination," Revision 03, 1/17/2003 NM-2001-3102, "Clarification of ASME Repair/Replacement Requirements/Adverse Trend in ASME Programs" Letter from U.S. Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated August 17, 2000, Subject: Nine Mile Point Nuclear Station, Unit Nos. 1 and 2 – Relief from the Requirements of 10 CFR 50.55a Related to Containment Inspection (TAC Nos. MA7116, MA7117, and MA7118)
ASME Section XI Inservice Inspection (Subsection IWF) Program (B2.1.25)	ASME Section XI, Subsection IWF, XI.S3	NMP Technical Report, LR-PBD-IWF, "ASME Section XI, Subsection IWF (Units 1 and 2)," Revision 1, 9/7/2005

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		LRG-08, NMP1 ASME Section XI ISI, Subsection IWF (GALL XI.S.3) Program Attribute Assessment, Revision 2, 8/5/2004 LRG-08, NMP2 ASME Section XI ISI, Subsection IWF (GALL XI.S.3) Program Attribute Assessment, Revision 2, 8/5/2004 NIP-IIT-01, "ASME Section XI Activities," Revision 14, 7/14/2003 QAP-TQS-2.61, "Qualifications of Nondestructive Examination Personnel," Revision 10, 7/29/2002 Letter from U.S. Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated October 5, 2000, Subject: Nine Mile Point Nuclear Station, Unit No. 1 – Reliefs for the Third 10-Year Inservice Inspection Program Plan, Revision 1 (TAC No. MA7129) Letter from U.S. Nuclear Regulatory Commission to Niagara Mohawk Power Corporation dated March 3, 2000, Subject: Nine Mile Point Nuclear Station, Unit No. 1 – Reliefs for the Second 10-Year Inservice Inspection Program Plan, Revision 1 (TAC No. MA6273) Regulatory Guide 1.147, Revision 13 (reprinted), Inservice Inspection Code Case Applicability, ASME Section XI, Division 1, January 2004 NMP2-ISI-006, "Second Inservice Inspection Interval, Inservice Inspection Program," Revision 3, 12/7/2001 DER-NM-1996-2610, "QI-Loose Pipe Clamp Bolts"

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		DER-NM-1994-900, "Failure To Re-establish Preservice Baseline Examinations" DER-NM-1998-2594, "IWD/IWF Minimum Percentage of Required Examinations May Not Have Been Met" DER-NM-1998-2595, "ASME Section XI Code Requirement To Remove Insulation For VT-3 Examinations Not Being Met" NMP1-IWE-003, "Containment Inservice Inspection Plan and Schedule for the First Inservice Inspection Interval December 26, 1999 to December 25, 2009," Revision 2 NDEP-VT-2.01, "ASME Section XI Visual Examination," Revision 16, 8/9/2003 DER-NM-2001-1145, "QA Audit: Inadequate Implementation of ASME XI Inservice Inspection Program Indicating Weak Change Management and Configuration"
10 CFR 50 Appendix J Program (B2.1.26)	10 CFR Part 50, Appendix J, XI.S4	NMP Technical Report, LR-PBD-APPJ, "Program Attribute Assessment: Unit 1 10 CFR 50, Appendix J Program and Unit 2 10 CFR 50, Appendix J Program" "Program Attribute Assessment: Unit 1 10 CFR 50, Appendix J Program and Unit 2 10 CFR 50, Appendix J Program" NMP1-APPJ-001, "10 CFR 50 Appendix J Testing Program Plan" NER-1M-034, "10 CFR Part 50 Appendix J Performance Based Containment Leak Rate Testing" N1-TSP-201-550, "Local Leak Rate Test Summary (Type B and C Tests) for 10 CFR 50 Appendix J and Secondary Containment

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		Bypass Leakage" N1-ISP-LRT-TYB, "Type "B" Leak Rate Test" N1-ISP-LRT-TYC, "Type "C" Containment Isolation Valve Leak Rate Test" N1-TSP-201-001, "Integrated Leak Rate Test of Primary Containment Type "A" Test" N1-ISP-201-501, "Type "B" Containment Isolation Air-Lock Doors Leak Rate Test" NMP2-APPJ-001, "10 CFR 50 Appendix J Testing Program Plan" NER-2A-001, "10 CFR Part 50 Appendix J Performance Based Testing Component Evaluations" N2-TSP-CNTR-003, " Local Leak Rate Test Summary" N2-TSP-CNT-001, "Reactor Containment Building Integrated Leak Rate Test"
Masonry Wall Program (B2.1.27)	Masonry Wall Program, XI.S5	NMP Technical Report, LR-PBD-MASONRY, "Masonry Wall Program (Units 1 and 2)," Revision 0, 9/13/2005 Reference Structures Monitoring Program
Structures Monitoring Program (B2.1.28)	Structures Monitoring Program, XI.S6	NMP Technical Report, LR-PBD-STRUCMON, "Structures Monitoring Program (Units 1 and 2)," Revision 0, 9/12/2005 NMP Technical Report, LR-PBD-MASONRY, "Masonry Wall Program (Units 1 and 2)," Revision 0, 9/13/2005 LRG-08, Units 1 and 2 Structures Monitoring Program Attribute Assessment, Revision 1, 2/13/2004

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		DER-NM-1992-114-Closed, "Cracked Concrete" DER-NM-1996-1951-Closed, "Cracking/Shifting Wall" DER-NM-1994-376-Closed, "Groundwater Inleakage to TB Pipe Tunnel" DER-NM-1998-159-Closed, "Groundwater Inleakage into Turbine Bldg. SWP Tunnel Through New Cracks" NEG-2S-017, "Maintenance Rule Structural Assessment and Monitoring Program," Revision 3, 3/13/2001 S-MRM-REL-0102, "Structural Assessment and Monitoring Program," Revision 02, 2/14/2000 N1-MRM-REL-0104, "NMP1 Maintenance Rule Scope," Revision 18, 9/30/2003 N2-MRM-REL-0104, "NMP2 Maintenance Rule Scope," Revision 15, 8/1/2003 N2-FSP-FPP-R001, "Fire Rated Assy's & Watertight Penetration Visual Inspection," Revision 3, 12/7/2000 N2-MPM-GEN-10Y017, "Diesel Generator Building Missile Protection Stop Logs Caulk Inspection," Revision 01, 12/7/1999 N2-MPM-GEN-A016, "Probable Maximum Precipitation (PMP) Flood Berm and 10,000 Year Culvert Inspection," Revision 03, 6/15/1994 N2-MSP-GEN-V001, "Revetment Ditch Structure Inspection," Revision 05, 5/9/2000

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
Non-EQ Electrical Cables and Connections Program (B2.1.29)	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements, XI.E1	NMP Technical Report, LR-PBP-ELECT1, "Aging Management Program for Electrical Cables and Connections not Subject to 10 CFR 50.49 Environmental Qualification Requirement," Revision 0, 9/14/2005 Units 1 and 2 Electrical Cables and Connections Program, Revision 0
Non-EQ Electrical Cables Used in Instrumentation Circuits Program (B2.1.30)	Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits, XI.E2	NMP Technical Report, LR-PBD-ELECT2, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits," Revision 2, 9/16/2005 NMP Non-EQ Instrumentation Cable Inspection Program Attribute Assessment, Revision 1 DER-NM-1998-3924, OE - SRM and IRM Detector Defects NMP-AMP-ELECT02, "Non-EQ Cables and Connections Used in Instrumentation Circuits Program," Revision 0, 8/26/2005 NI-ST-V3, "Rod Worth Minimizer Operability Test," Revision 9, 8/12/2005 NI-RSP-9C, "Instrumentation Channel Calibration of Emergency Condenser Vent Radiation Monitors," Revision 6, 8/11/2005 NI-RESP-2, "LPRM Calibration Flux AMP Gain Adjustment," Revision 1, 8/12/2005 NI-RSP-8Q, "Routine Calibration of Refueling Platform High Range Area Radiation Monitor," Revision 6, 8/12/2005

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		NI-RSP-6C, "Control Room Ventilation Radiation Monitor Instrument Channel Calibration," Revision 8, 8/12/2005 NI-RTP-31, "Calibration of General Electrical Area Radiation Monitors," Revision 8, 8/12/2005 NER-1E-028, "Identification of NMP1 Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits in the Scope of Licensing Renewal Application Program," Revision 0, 6/16/2005 NER-2E-033, "Identification of NMP2 Non-EQ Electrical Cables and Connections Used in Instrumentation Circuits in the Scope of Licensing Renewal Application Program," Revision 0, 6/22/2005
Non-EQ Inaccessible Medium Voltage Cables Program (B2.1.31)	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements, XI.E3	NMP Technical Report, LR-PBD-ELECT3, "Inaccessible Medium-Voltage Cable not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Unit 2 Only)," Revision 0, 10/10/2005 NMP Non-EQ Medium-Voltage Inaccessible Cable Inspection Program Attribute Assessment, Revision 1 S-EPM-GEN-072, Revision 1, Examination of Conduit, Junction Boxes, Pull Boxes and Equipment Connection Boxes for Possible Moisture Intrusion N2-EPM-GEN-V690, Revision 4, Outdoor Transformer, Switchyard, and Manhole Check NMP-AMP-ELECT03, "Inaccessible Non-EQ Medium Voltage Cables Inspection Program," Revision 0, 10/7/2005

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		S-EPM-MPM-V080, "Site AC Motor Predictive Maintenance Testing," Revision 02, 10/6/2005 S-EPM-700, "Outdoor Transformer and Grounding Transformer Inspection PM," Revision 1, 10/6/2005 S-EPM-GEN-702, "Associated Transformer and Switchyard PMS," Revision 0, 10/6/2005 NER-1E-026, "Identification of NMP1 Non-EQ Inaccessible Medium Voltage Cables in the Scope of the License Renewal Program," Revision 0, 5/23/2005 NER-2E-032, "Identification of NMP2 Non-EQ Inaccessible Medium Voltage Cables in the Scope of the License Renewal Program," Revision 1, 10/4/2005 "Identification of NMP1 Non-EQ Inaccessible Medium Voltage Cables in the Scope of the License Renewal Program," Revision 0, 5/23/2005
Preventive Maintenance Program (B2.1.32)	Plant-Specific	**Assigned to DE**
System Walkdown Program (B2.1.33)	Plant-Specific	**Assigned to DE**
Non-Segregated Bus Inspection Program (B2.1.34)	Plant-Specific	NMP Technical Report, LR-PBD-ELECT4, "Aging Management Program for Bus Duct," Revision 0, 9/9/2005 NMP-AMP-ELECT04, "Bus Duct Inspection Program," Revision 0, 7/20/2005 S-EPM-GEN-700, "Outdoor Transformer and Grounding Transformer Inspection PM," Revision 1

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		NER-1E-029, "Identification of the NMP1 Bus Ducts in the Scope of License Renewal Aging Management Program," Revision 0, 6/3/2005 NER-2E-034, "Identification of the NMP2 Bus Ducts in the Scope of License Renewal Aging Management Program," Revision 0, 6/7/2005 EPRI TR-109619, Guideline for the Management of Adverse Localized Equipment Environments, June 1999 IEEE Std. P1205-2000, IEEE Guide for Assessing, Monitoring, and Mitigation Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations NUREG/CR-5643, Insights Gained from Aging Research, March 1992 SAND 96-0344, Aging Management Guideline for Commercial Nuclear Power Plants- Electric Cables and Terminations, September 1996
Fuse Holder Inspection Program (B2.1.35)	Plant-Specific	**Assigned to DE**
Bolting Integrity Program (B2.1.36)	Bolting Integrity, XI.M18	**Assigned to DE**
BWR Control Rod Drive Return Line (CRDRL) Nozzle Program (B2.1.37)	BWR Control Rod Drive Return Line Nozzle, XI.M6	NMP Technical Report, LR-PBD-CRDRL, "BWR Control Rod Drive Return Line Nozzle (Units 1 and 2)," Revision 1, 9/7/2005
Protective Coating Monitoring and Maintenance Program (B2.1.38)	Protective Coating Monitoring and Maintenance Program, XI.S8	NMP Technical Report, LR-PBD-COATING, "Protective Coating Monitoring and Maintenance Program (Units 1 and 2)," Revision 1, 9/14/2005 Niagara Mohawk Power Corporation to the U.S. Nuclear Regulatory Commission dated November 10, 1998 (Letter No. NMP1L 1380)

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		ASTM D5163-05a, Standard Guide for Establishing Procedures to Monitor the Performance of Coating Service Level 1 Coatings Systems in an Operating Nuclear Power Plant, American Society for Testing and Materials ANSI N101.4, Quality Assurance for Protective Coatings Applied to Nuclear Facilities, American National Standards Institute, 1972 ANSI N101.2, Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities, American National Standards Institute, 1972 ANSI N5.12, Protective Coatings (Paints) for the Nuclear Industry, American National Standards Institute, 1974 ANSI/ASME NQA-1, Quality Assurance Program Requirements for Nuclear Facilities, The American Society of Mechanical Engineers, 1983
Non-EQ Electrical Cable Metallic Connections Inspection Program (B2.1.39)	Plant-Specific	**Assigned to DE**
Wooden Power Pole Inspection Program (NMP Unit 2 Only) (B2.1.40)	Plant-Specific	NMP Technical Report, LR-PBD-ELECTPOLE, "Wooden Power Pole Inspection Program," Revision 0, 9/9/2005
Environmental Qualification Program (B3.1)	X.E1	Unit 1 and 2 Environment Qualification Program Attribute Assessment, Revision 0 OT-EDS-016, Environmental Qualification Required Maintenance (EQRM/MQRM), Revision 7 NIP-EQP-01, Environmental Qualification Program, Revision 4

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		Units 1 and 2 Environmental Qualification Program Attribute Assessment, Revision 0, 12/29/2003 NDD-EQP, "Environmental Qualification Program," Revision 2, 10/7/2004 NIP-CON-01, "Design and Configuration Control Process," Revision 11, 9/9/2005 NIP-EQP-01, "Environmental Qualification Program," Revision 5, 10/5/2004
Fatigue Monitoring Program (B3.2)	X.M1	"Program Attribute Assessment Unit 1 and 2 Fatigue Monitoring Program" NIP-REL-06, Revision 02, "Fatigue Monitoring Program," 7/20/2004 NMP Unit 1 Feedwater Nozzle Fatigue Evaluation, MPR-1484, Revision 1, 3/1999 DER-NM-1993-875, 3/31/1993 DER-NM-1999-3551, 10/22/1999 DER-2003-1096, "Fatigue Monitoring Program Gaps," 3/18/2003 DER-2003-1097, 3/18/2003 DER-NM-2003-5075, 12/30/1999 NER-1S-035, "Report on System Review and Recommendations for a Transient and Fatigue Monitoring System at the Nine Mile Point Nuclear Station," Revision 0, 2/10/2004 NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components," 2/28/1995 (ML031480219)

Applicant's Aging Management Program	GALL Aging Management Program	NMP ALRA-AMP Basis Document and Other Documents Reviewed
		DER-NM-1999-3551-Closed, 10/22/1999 DER-NM-2003-5075, 12/30/1999
Torus Corrosion Monitoring Program (NMP Unit 1 Only) (B3.3)	NA	**Assigned to DE**

Applicant's AMR Sections and Systems for NMP	NMP ALRA-AMR Basis Document and Other Documents Reviewed
3.1 Reactor Vessel, Internals and Reactor Coolant System	Technical Basis for Material-Environment Group Inputs to the CONRAD Database, Revision 6, 9/2004 NMP Unit 1, Reactor Pressure Vessel (RPV), AMR, Revision 0, 1/12/2004 NMP Unit 1, Reactor Pressure Vessel (RPV), S&S, Revision 0, 12/12/2003 NMP Unit 1, Reactor Pressure Vessel Internals (RPVI), S&S, Revision 0, 12/12/2003 NMP Unit 1, Reactor and Containment Instrumentation (RXVI), AMR, Revision 0, 11/14/2003 NMP Unit 1, Reactor and Containment Instrumentation (RXVI), S&S, Revision 0, 1/13/2003 NMP Unit 1, Reactor Recirculation System (RR), AMR, Revision 0, 11/20/2003 NMP Unit 1, Reactor Recirculation System (RR), S&S, Revision 2, 8/12/2004 NMP Unit 1, Control Rod Drive Hydraulic System (CRD), AMR, Revision 0, 11/4/2003 NMP Unit 1, Control Rod Drive Hydraulic System (CRD), S&S, Revision 1, 3/11/2004

Applicant's AMR Sections and Systems for NMP	NMP ALRA-AMR Basis Document and Other Documents Reviewed
	NMP Unit 2, Reactor Pressure Vessel (RPV), AMR, Revision 0, 12/30/2003 NMP Unit 2, Reactor Pressure Vessel (RPV), S&S, Revision 1, 12/12/2003 NMP Unit 2, Reactor Pressure Vessels Internals (RVI), AMR, Revision 0, 1/7/2004 NMP Unit 2, Reactor Pressure Vessels Internals (RVI) S&S, Revision 1, 12/12/2003 NMP Unit 2, Reactor Vessel Instrumentation (ISC), AMR, Revision 1, 3/23/2004 NMP Unit 2, Reactor Vessel Instrumentation, (ISC), S&S Revision 1, 3/26/2004 NMP Unit 2, Control Rod Drive (RDS), S&S, Revision 1, 2/6/2004 NMP Unit 2, Control Rod Drive (RDS), AMR, Revision 0, 11/25/2003
3.2 Engineered Safety Features	Technical Basis for Material-Environment Group Inputs to the CONRAD Database, Revision 6, 9/2004 NMP Unit 1, Emergency Cooling (EC), AMR, Revision 1, 3/5/2004 NMP Unit 1, Emergency Cooling (EC), S&S, Revision 0, 8/11/2003 NMP Unit 1, Containment Spray (CTN-SP), S&S, Revision 0, 10/17/2003 NMP Unit 1, Containment Spray (CTN-SP) AMR, Revision 0, 2/18/2004 NMP Unit 1, Core Spray (CRS) AMR, Revision 0, 10/27/2003 NMP Unit 1, Core Spray (CRS), S&S, Revision 1, 10/17/2003

Applicant's AMR Sections and Systems for NMP	NMP ALRA-AMR Basis Document and Other Documents Reviewed
	NMP Unit 2, Low Pressure Core Spray (CSL), AMR, Revision 0, 10/17/2003 NMP Unit 2, Low Pressure Core Spray (CSL), S&S Revision 0, 2/20/2003 NMP Unit 2, Standby Gas Treatment System (GTS), AMR Revision 0, 10/29/2003 NMP Unit 2, Standby Gas Treatment System (GTS), S&S, Revision 0, 2/4/2003 NMP Unit 2, Residual Heat Removal (RHS), AMR, Revision 1, 3/16/2004 NMP Unit 2, Residual Heat Removal (RHS), S&S, Revision 0, 9/18/2003 NMP Unit 2, High Pressure Core Spray (CSH), AMR, Revision 0, 10/27/2003 NMP Unit 2, High Pressure Core Spray (CSH), S&S, Revision 1, 2/12/2004
3.3 Auxiliary Systems	Technical Basis for Material-Environment Group Inputs to the CONRAD Database, Revision 6, 9/2004 NMP Unit 1, Compressed Air System (CAS), Revision 1, 2/18/2004 NMP Unit 1, Containment System (CTN), Revision 0, 2/3/2004 NMP Unit 1, Control Room HVAC (CRAC), Revision 0, 2/18/2004 NMP Unit 1, Diesel Generator Building Ventilation (DGAC), Revision 0, 11/4/2003 NMP1, Fire Detection and Protection (FDP), Revision 0, 2/2/2004 NMP Unit 1, Neutron Monitoring (NEU), Revision 0,

Applicant's AMR Sections and Systems for NMP	NMP ALRA-AMR Basis Document and Other Documents Reviewed
	11/20/2003 NMP Unit 1, Reactor Building Closed Loop Cooling, (RBCLC), Revision 0, 2/9/2004 NMP Unit 1, Reactor Water Cleanup (CU), Revision 0, 2/23/2004 NMP Unit 1, Sampling System (SS), Revision 0, 2/13/2004 NMP Unit 1, Shutdown Cooling (SDC), Revision 0, 1/12/2004 NMP Unit 1, Spent Fuel Pool Cooling and Filtering (FP), Revision 0, 11/24/2003 NMP Unit 1, Turbine Building HVAC (TBAC), Revision 0, 11/18/2003 NMP Unit 1, Radiological Waste System (RWS), Revision 0, 1/5/2004 NMP Unit 1, Service Water (SW), Revision 0, 2/18/2004 NMP Unit 2, Alternate Decay Heat Removal (ADH), Revision 0, 10/2/2003 NMP Unit 2, Auxiliary Building HVAC, (HVL), Revision 0, 10/23/2003 NMP Unit 2, Compressed Air System, (CAS), Revision 0, 12/18/2003 NMP Unit 2, Control Building HVAC, (HVC), Revision 0, 1/23/2004 NMP Unit 2, Diesel Generator Building Ventilation (HVP), Revision 0, 9/17/2003 NMP Unit 2, Engine Driven Fire Pump-Fuel Oil (FOF), Revision 0, 12/10/2003

Applicant's AMR Sections and Systems for NMP	NMP ALRA-AMR Basis Document and Other Documents Reviewed
	NMP Unit 2, Floor and Equipment Drains (FED), Revision 0, 12/9/2003 NMP Unit 2, Primary Containment Purge System (CPS), Revision 0, 11/13/2003 NMP Unit 2, Reactor Building Closed Loop Cooling (CCP), Revision 0, 1/12/2004 NMP Unit 2, Reactor Building HVAC (HVC), Revision 0, 2/19/2004 NMP Unit 2, Service Water System (SWP), Revision 0, 1/15/2001 NMP Unit 2, Spent Fuel Pool Cleaning, Revision 0, 12/5/2003 NMP Unit 2, Air Start-up Emergency Diesel Generator (EGA), Revision 0, 1/16/2004 NMP Unit 2, Reactor Water Cleanup System (WCS), Revision 0, 2/2/2004 NMP Unit 2, Emergency Diesel Generator System (EGF), Revision 0, 1/23/2004 NMP Unit 2, Emergency Diesel Lube Oil (EGO), Revision 0, 1/15/2004 NMP Unit 2, Yard Structures Ventilation (HVY), Revision 0, 1/8/2004 NMP Unit 1, Compressed Air System (CAS), S&S, Revision 0, 2/23/2004 NMP Unit 1, Containment (CTN), S&S, Revision 0, 1/14/2004 NMP Unit 1, Control Room HVAC (CRAC), S&S, Revision 0, 12/3/2003

Applicant's AMR Sections and Systems for NMP	NMP ALRA-AMR Basis Document and Other Documents Reviewed
	NMP Unit 1, Diesel Generator Building Ventilation (DGAC), S&S, Revision 0, 11/14/2003 NMP Unit 1, Fire Detection and Protection (FDP), S&S, Revision 0, 11/20/2003 NMP Unit 1, Neutron Monitoring (NEU), S&S, Revision 1, 2/12/2004 NMP Unit 1, Reactor Building Closed Loop Cooling (RBCLC), S&S, Revision 0, 1/7/2004 NMP Unit 1, Reactor Water Cleanup (CU), S&S, Revision 1, 3/12/2004 NMP Unit 1, Sampling System (SS), S&S, Revision 0, 1/13/2004 NMP Unit 1, Shutdown Cooling (SDC), S&S, Revision 0, 12/4/2003 NMP Unit 1, Spent Fuel Pool (FP), S&S, Revision 1, 3/12/2004 NMP Unit 1, Turbine Building HVAC (TBAC), S&S, Revision 0, 2/3/2004 NMP Unit 1, Radiation Waste Building HVAC, (RWAC), S&S, Revision 0, 10/21/2003 NMP Unit 1, Service Water Emergency Service Water, (SW & ESW), S&S, Revision 0, 1/28/2004 NMP Unit 2, Alternate Decay Heat Removal (ADH), S&S, Revision 0, 9/5/2003 NMP Unit 2, Compressed Air Systems (CAS), S&S, Revision 0, 1/10/2003 NMP Unit 2, Control Building HVAC, (HVC), S&S, Revision 1, 3/31/2004 NMP Unit 2, Diesel Generator Building Ventilation, (HVP),

Applicant's AMR Sections and Systems for NMP	NMP ALRA-AMR Basis Document and Other Documents Reviewed
	S&S, Revision 0, 10/28/2003 NMP Unit 2, Engine Driven Fire Pump-Fuel Oil (FOF), S&S, Revision 0, 9/4/2003 NMP Unit 2, Floor and Equipment Drains (FED), S&S, Revision 0, 10/8/2003 NMP Unit 2, Primary Containment Purge (CPS), S&S, Revision 0, 3/3/2003 NMP Unit 2, Spent Fuel Pool (FP), S&S, Revision 1, 3/12/2004 NMP Unit 2, Air Start-up Emergency Diesel Generator (EGA), S&S, Revision 0, 12/5/2003 NMP Unit 2, Reactor Water Cleanup (WCS), S&S, Revision 0, 6/2/2003 NMP Unit 2, Yard Structures Ventilation (HVY), S&S, Revision 0, 10/1/2003 NMP Unit 1, Circulating Water System (CW), AMR, Revision 0, 11/20/2003 NMP Unit 1, Circulating Water System (CW), S&S, Revision 0, 2/6/2004 NMP Unit 1, Liquid Poison (LP), AMR, Revision 0, 10/30/2003 NMP Unit 1, Liquid Poison (LP), S&S, Revision 0, 9/4/2003 NMP Unit 1, Fire Detection and Protection (FDP), AMR, Revision 0, 2/2/2004 NMP Unit 1, Fire Detection and Protection (FDP), S&S, Revision 0, 11/11/2003 NMP Unit 2, Control Building Chilled Water (HVK), AMR, Revision 0, 2/9/2004

Applicant's AMR Sections and Systems for NMP	NMP ALRA-AMR Basis Document and Other Documents Reviewed
	NMP Unit 2, Control Building Chilled Water (HVK), S&S, Revision 0, 9/11/2003
3.4 Steam and Power Conversion Systems	Technical Basis for Material-Environment Group Inputs to the CONRAD Database, Revision 6, 9/2004 NMP Unit 1, Condensate System (CS) AMR, Revision 0, 12/16/2003 NMP Unit 1, Feedwater High Pressure Coolant Injection System (FW/HPCI), AMR, Revision 0, 1/15/2004 NMP Unit 1, Feedwater High Pressure Coolant Injection System (FW/HPCI), S&S, Revision 0, 10/30/2003 NMP Unit 1, Main Generator and Auxiliary System (GEN), AMR, Revision 0, 11/14/2003 NMP Unit 1, Main Generator and Auxiliary System (GEN), S&S Revision 0, 5/20/2003 NMP Unit 1, Main Steam System (MS), AMR, Revision 0, 10/8/2003 NMP Unit 1, Main Steam System (MS) S&S, Revision 0, 2/13/2003 NMP Unit 2, Condensate Air Removal and Off Gas, Scoping and Screening, Revision 0, 10/8/2003 NMP Unit 2, Condensate System (CNM), AMR, Revision 0, 11/24/2003 NMP Unit 2, Condensate System, (CNM), S&S, Revision 0, 9/5/2003 NMP Unit 2, Feedwater System (FWS), AMR, Revision 0, 12/10/2003 NMP Unit 2, Feedwater System (FWS), S&S, Revision 0, 9/8/2003 NMP Unit 2, Main Stream System, (MSS), AMR, Revision 0,

Applicant's AMR Sections and Systems for NMP	NMP ALRA-AMR Basis Document and Other Documents Reviewed
	11/13/2003 NMP Unit 2, Main Steam System (MSS), S&S, Revision 1, 2/10/2004 NMP Unit 2, Moisture Separators and Reheat (MSR), S&S, Revision 0, 1/31/2003
3.5 Containments, Structures, and Component Supports	Technical Basis for Material-Environment Group Inputs to the CONRAD Database, Revision 6, 9/2004 NMP Unit 1, Materials Handling System Scoping and Screening, Revision 1, 3/12/2004 MHS, Material Handling System, Plant System, - NMP Unit 1 (Aging Management Review), Revision 0, 3/25/2003 NMP Unit 1 Screen and Pumphouse Building Aging Management Review, Revision 0, 8/14/2003 NMP Unit 1, Screen and Pumphouse Building Scoping and Screening, Revision 1, 3/2/2004 NMP Unit 1, Radwaste Solidification/Storage Building Aging Management Review, Revision 0, 8/14/2003 NMP Unit 1, Radwaste Solidification/Storage Scoping and Screening Building, Revision 1, 3/2/2004 NMP Unit 1, Off Gas Building Scoping & Screening, Revision 1, 3/2/2004 NMP Unit 1, Off Gas Building Aging Management Review, Revision 0, 8/14/2003 NMP Unit 1, Fuel Handling System Aging Management Review, Revision 0, 8/12/2003 NMP Unit 1, Fuel Handling System Scoping and Screening, Revision 1, 3/12/2004 NMP Unit 2, Fuel Handling System Aging Management Review, Revision 1, 3/10/2004

Applicant's AMR Sections and Systems for NMP	NMP ALRA-AMR Basis Document and Other Documents Reviewed
	NMP Unit 2, Fuel Handling System Scoping and Screening, Revision 2, 3/12/2004 NMP Unit 2, Radwaste Building Scoping and Screening, Revision 3, 3/2/2004 NMP Unit 2, Radwaste Building Aging Management Review, Revision 2, 8/14/2003 NMP Unit 2, Standby Gas Treatment Building and Railroad Access Lock Aging Management Review, Revision 0, 8/12/2003 NMP Unit 2, Standby Gas Treatment Building Scoping/Screening, Revision 0, 6/16/2003 NMP Unit 2, Screenwell Building Scoping and Screening, Revision 1, 3/2/2004 NMP Unit 2, Screenwell Building Aging Management Review, Revision 0, 8/12/2003 NMP Unit 2, Component Supports System Scoping/Screening, Revision 0, 6/24/2003 NMP Unit 2, Component Supports Aging Management Review, Revision 0, 8/12/2003 NMP Unit 1, Component Support System Scoping/Screening, Revision 0, 6/25/2003 NMP Unit 1, Component Supports Aging Management Review, Revision 0, 8/4/2003 NMP Unit 2, Turbine Building Scoping and Screening, Revision 3, 3/2/2004 NMP Unit 2, Turbine Building Aging Management Review, Revision 2, 8/14/2003 NMP Unit 2, Materials Handling System Aging Management Review, Revision 0, 8/12/2003

Applicant's AMR Sections and Systems for NMP	NMP ALRA-AMR Basis Document and Other Documents Reviewed
	NMP Unit 2, Materials Handling System Scoping and Screening, Revision 3, 3/12/2004 NMP Unit 2, Main Stack Aging Management Review, Revision 0, 8/12/2003 NMP Unit 2, Main Stack Scoping and Screening, Revision 1, 3/12/2004 NMP Unit 2, Diesel Generator Building Aging Management Review, Revision 0, 8/12/2003 NMP Unit 2, Diesel Generator Building Scoping and Screening, Revision 1, 3/15/2004 NMP Unit 2, Essential Yard Structures Scoping and Screening, Revision 2, 3/2/2004 NMP Unit 2, Essential Yard Structures Aging Management Review, Revision 1, 12/16/2003 NMP Unit 2, Control Room Building and Screening, Revision 2, 8/13/2003 NMP Unit 2, Control Room Building Aging Management Review, Revision 2, 8/14/2003 NMP Unit 2, Auxiliary Service Building Scoping/Screening, Revision 0, 6/19/2003 NMP Unit 2, Auxiliary Service Building Aging Management Review, Revision 0, 8/12/2003 NMP Unit 2, Reactor Building Scoping and Screening, Revision 1, 3/3/2004 NMP Unit 2, Reactor Building Aging Management Review, Revision 0, 8/13/2003 NMP Unit 2, Primary Containment Building Aging Management Review, Revision 1, 3/18/2004 NMP Unit 2, Primary Containment Building Scoping and

Applicant's AMR Sections and Systems for NMP	NMP ALRA-AMR Basis Document and Other Documents Reviewed
	Screening, Revision 2, 3/19/2004 NMP Unit 1, Vent Stack Scoping and Screening, Revision 1, 3/2/2004 NMP Unit 1, Vent Stack Aging Management Review, Revision 0, 8/14/2003 NMP Unit 1, Waste Disposal Building Scoping and Screening, Revision 1, 3/2/2004 NMP Unit 1, Waste Disposal Building Aging Management Review, Revision 0, 8/14/2003 NMP Unit 1, Turbine Building Scoping and Screening, Revision 1, 3/2/2004 NMP Unit 1, Turbine Building Aging Management Review, Revision 0, 8/14/2003 NMP Unit 1, Yard Structure – Essential (YSE)/Scoping and Screening Report, Revision 1, 11/14/2003 NMP Unit 1, Essential Yard Structure Aging Management Review, Revision 1, 12/16/2003 NMP Unit 1, Reactor Building Aging Management Review, Revision 0, 8/14/2003 NMP Unit 1, Reactor Building Scoping and Screening, Revision 1, 3/3/2003 NMP Unit 1, Primary Containment Structure Scoping/Screening, Revision 0, 8/15/2003 NMP Unit 1, Primary Containment Structure, Revision 1, 3/18/2004
3.6 Electrical, Instrumentation and Controls	Technical Basis for Material-Environment Group Inputs to the CONRAD Database, Revision 6, 9/2004

Nine Mile Point Audit and Review Report

Attachment 6

License Renewal Commitments

Nine Mile Point Unit 1		
ITEM	**COMMITMENT**	**SCHEDULE**
1	Incorporate Appendix A1 into the UFSAR	Following the issuance of the renewed Operating License
2	In accordance with 10 CFR 54.21(b), during NRC review of this application, provide an annual update to the application to reflect any change to the current licensing basis that materially affects the contents of the License Renewal Application (LRA).	December 31, 2005
3	Apply for relief from reactor vessel circumferential weld inspections for the period of extended operation. Supporting analyses, procedural controls, and operator training will be completed prior to the period of extended operation to support and confirm that the RPV circumferential weld failure probability remains acceptable for the period of extended operation.	Prior to Period of Extended Operation
4	Supporting analyses will be completed prior to the period of extended operation to confirm that the failure probabilities for the limiting RPV axial welds remain bounded for the period of extended operation.	Prior to Period of Extended Operation
5	For those locations where additional fatigue analysis is required to take advantage of the implicit margin, and to more accurately determine cumulative usage factor (CUFs), the EPRI FatiguePro fatigue monitoring software will be implemented prior to the period of extended operation.	Prior to Period of Extended Operation
6	For the critical reactor vessel component locations, shown in Table 4.3-3 of the LRA, additional usage will be added to the baseline Cumulative Usage Factor using one of the methods described in Section 4.3 of the LRA.	Prior to Period of Extended Operation
7	Transients contributing to fatigue usage of the FWS nozzles will be tracked by the Fatigue Monitoring Program (FMP) with additional usage added to the baseline Cumulative Usage Factor using the Stress Based fatigue method described in Section 4.3 of the LRA.	Prior to Period of Extended Operation

Nine Mile Point Unit 1		
ITEM	**COMMITMENT**	**SCHEDULE**
8	Develop a baseline Cumulative Usage Factor (CUF) for the specified portions of the following systems: (1) Feedwater/High Pressure Coolant Injection (2) Core Spray (3) Reactor Water Cleanup (piping inside the Reactor Coolant Pressure Boundary) and (4) Reactor Recirculation (and associated Shutdown Cooling Systems Lines). If the baseline CUF for a specified portion of a system exceeds 0.4, the limiting locations may require additional monitoring to demonstrate compliance over the period of extended operation.	Prior to Period of Extended Operation
9	Assess the impact of the reactor coolant environment on a sample of critical component locations, including locations equivalent to those identified in NUREG/CR-6260, as part of the Fatigue Monitoring Program. These locations will be evaluated by applying environmental correction factors (F_{en}) to existing and future fatigue analyses.	Prior to Period of Extended Operation
10	The Fatigue Monitoring Program will track transients specific to the Emergency Cooling System with additional usage added to the baseline Cumulative Usage Factor for the emergency condensers as described in Section 4.3 of the LRA.	Prior to Period of Extended Operation
11	Enhance the Fatigue Monitoring Program to (1) ensure that fatigue usage of the torus attached piping and other torus locations does not exceed the design limits, add ERV lifts as a transient to be counted by the Fatigue Monitoring Program and (2) add the two highest usage torus attached piping locations, the 12-inch core spray suction line for Core Spray Pump 111 that enters the torus at penetration XS-337 and the 3-inch containment spray line that enters the torus at penetration XS-326 as fatigue monitoring locations.	Prior to Period of Extended Operation
12	The RPV weld flaw evaluations will be revised to consider additional fatigue crack growth and the effects of additional irradiation embrittlement (for beltline materials) associated with operation for an additional 20 years (i.e., out to at least 46 EFPY) and submitted for NRC review and approval no later than 2 years prior to the period of extended operation. If the revised calculation shows the identified flaws cannot meet the applicable acceptance criteria, the indications will be reexamined in accordance with ASME Section XI requirements.	August 22, 2007

Nine Mile Point Unit 1		
ITEM	**COMMITMENT**	**SCHEDULE**
13	Enhance the BWR VIP to address the following: (1) BWRVIP-18 open item regarding the inspection of inaccessible welds for core spray system. As such, NMPNS will implement the resolution of this open item as documented in the BWRVIP response and reviewed and accepted by the NRC; (2) The inspection and evaluation guidelines for steam dryers are currently under development by the BWRVIP committee. Once these guidelines are documented, and reviewed and accepted by the NRC, the actions will be implemented in accordance with the BWRVIP program; (3) The baseline inspections recommended in BWRVIP-47 for the BWR lower plenum components will be incorporated into the appropriate program and implementing documents; and (4) The reinspection scope and frequency for the grid beam going forward will be based on BWRVIP-26A guidance for plant specific flaw analysis and crack growth assessment. The maximum reinspection interval for the grid beam will not exceed 10 years consistent with standard BWRVIP guidance for the core shroud. The reinspection scope will be equivalent to the UT baseline 2005 inspection scope. In addition, the reinspection scope will include an EVT-1 sample inspection of at least 2 locations with accessible indications within the initial 6 years of the 10 year interval. The intent of the EVT-1 is to monitor the known cracking to confirm flaw analysis crack growth assumptions.	Prior to Period of Extended Operation
14	Enhance the Open Cycle Cooling Water System (OCCWS) Program to (1) Ensure that the applicable commitments made for GL 89-13, and the requirements in NUREG-1801, Section XI.M20 are captured in the implementing documents for GL 89-13; (2) Incorporate into the OCCWS program, the requirements of the NUREG-1801, Section XI.M20 that are more conservative than the GL 89-13 commitments; and (3) Revise the preventive maintenance and heat transfer performance test procedures to incorporate specific inspection criteria, corrective actions, and frequencies.	Prior to Period of Extended Operation

Nine Mile Point Unit 1		
ITEM	**COMMITMENT**	**SCHEDULE**
15	Enhance the Closed Cycle Cooling Water System (CCCWS) Program to (1) Expand periodic chemistry checks of the systems consistent with the guidelines of EPRI TR-107396;(2) Implement a program to use corrosion inhibitors in the Reactor Building Closed Loop (RBCL) Cooling Systems and Control Room HVAC System in accordance with the guidelines given in EPRI TR-107396; (3) Direct periodic inspections to monitor for loss of material in the piping of the CCCWS; (4) Implement a corrosion monitoring program for larger bore CCCW piping not subject to inspection under another program; (5) Establish the frequencies to inspect for degradation of components in CCCWS, including heat exchanger tube wall thinning; (6) Perform a heat removal capability test for the Control Room HVAC System at least every 5 years; (7) Establish periodic monitoring, trending, and evaluation of performance parameters for the RBCL cooling and Control Room HVAC; (8) Provide the controls and sampling necessary to maintain water chemistry parameters in CCCWS within the guidelines of EPRI Report TR 107396; and (9) Ensure acceptance criteria are specified in the implementing procedures for the applicable indications of degradation.	Prior to Period of Extended Operation
16	The Boraflex Monitoring Program will be enhanced to (1) Require periodic neutron attenuation testing and measurement of boron areal density to confirm the correlation of the conditions of test coupons to those of Boraflex racks that remain in use during the period of extended operation; and (2) Establish monitoring and trending instructions for in-situ test results, silica levels, and coupon results.	Prior to Period of Extended Operation
17	Revise applicable procedures related to the Crane Inspection Program to add specific direction for performance of corrosion inspections, with acceptance criteria, for certain hoist lifting assembly components.	Prior to Period of Extended Operation
18	Enhance the Compressed Monitoring Program to (1) Develop new activities to manage the loss of material, stress corrosion cracking, and perform periodic system leak checks;(2) Expand the scope, periodicity, and inspection techniques to ensure that the aging of certain sub-components of the dryers and compressors (e.g., valves, heat exchangers) are managed; (3) Develop and implement activities to address the failure mechanism of stress corrosion cracking in unannealed red brass piping; (4) Establish activities that manage the aging of the internal surfaces of carbon steel piping and that require system leak checks to detect deterioration of the pressure boundaries; and (5) Expand the acceptance criteria to ensure that the aging of certain sub-components of the dryers and compressors (e.g., valves, heat exchangers) are managed.	Prior to Period of Extended Operation

Nine Mile Point Unit 1		
ITEM	**COMMITMENT**	**SCHEDULE**
19	Enhance the Fire Protection Program to (1) Incorporate periodic visual inspections of piping and fittings located in a non-water environment such as Halon and Carbon Dioxide fire suppression systems components, to detect evidence of corrosion and any system mechanical damage that could affect its intended function; (2) Expand the scope of periodic functional tests of the diesel-driven fire pump to include inspection of engine exhaust system components to verify that loss of material is managed; (3) Perform an engineering evaluation to determine the plant specific inspection periodicity of fire doors; and (4) Revise Halon and Carbon Dioxide Functional test frequencies to semi-annual.	Prior to Period of Extended Operation
20	Enhance the Fire Water System Program by revising applicable existing procedures to (1) Incorporate inspections to detect and manage loss of material due to corrosion into existing periodic test procedures; (2) Specify periodic component inspections to verify that loss of material is being managed; (3) Add procedural guidance for performing visual inspections to monitor internal corrosion and detect biofouling; (4) Add requirements to periodically check the water-based fire protection systems for microbiological contamination; (5) Measure fire protection system piping wall thickness using non-intrusive techniques (e.g., volumetric testing) to detect loss of material due to corrosion; (6) Establish an appropriate means of recording, evaluating, reviewing, and trending the results of visual inspections and volumetric testing; (7) Define acceptance criteria for visual inspections and volumetric testing; and (8) Develop new procedures and PM tasks to implement sprinkler head replacements and/or inspections to meet National Fire Protection Association (NFPA) 25, “Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems,” Section 5.3.1 (2003 Edition) requirements.	Prior to Period of Extended Operation
21	Enhance the Fuel Oil Chemistry Program to (1) Establish a requirement to perform quarterly trending of water and sediment; (2) Provide guidelines for the appropriate use of biocides, corrosion inhibitors, and/or fuel stabilizers to maintain fuel oil quality; (3) Add requirements to periodically inspect the interior surfaces of the emergency diesel fuel oil storage tanks for evidence of significant degradation, including a specific requirement that the tank bottom thickness be determined by UT or other industry recognized methods (4) Add a requirement for quarterly trending of particulate contamination analysis results; (5) Ensure acceptance criteria are specified in the implementing procedures for the applicable indications of potential degradation; (6) Establish a requirement for periodic opening of the diesel fire pump fuel oil day tank drain; and (7) Establish a requirement to remove water, if found.	Prior to Period of Extended Operation

Nine Mile Point Unit 1		
ITEM	**COMMITMENT**	**SCHEDULE**
22	Enhance the Reactor Vessel Surveillance program to (1) Incorporate the requirements and elements of the Integrated Surveillance Program (ISP), as documented in BWRVIP-116 and approved by NRC, or an NRC approved plant-specific program into the Reactor Vessel Surveillance Program, and include a requirement that if NMPNS surveillance capsules are tested, the tested specimens will be stored in lieu of optional disposal. When the NRC issues a final safety evaluation report (SER) for BWRVIP-116, NMPNS will address any open items and complete the SER Action Items. Should BWRVIP-116 not be approved by the NRC, a plant specific reactor vessel surveillance program will be submitted to the NRC two years prior to commencement of the period of extended operation and (2) Project analyses of upper shelf energy and pressure temperature limits to 60 years using methods prescribed by Regulatory Guide 1.99, Revision 2, and include the applicable bounds of the data, such as operating temperature and neutron fluence.	August 22, 2007
23	Develop and implement a One-Time Inspection Program, which also includes the attributes for a Selective Leaching of Materials Program.	Prior to Period of Extended Operation
24	Develop and implement a Buried Piping and Tank Inspection Program which includes a requirement that before entry into the period of extended operation, if an opportunistic inspection has not occurred, NMPNS will excavate NMP Unit 1 degradation susceptible areas to perform focused inspections.	Prior to Period of Extended Operation
25	An augmented VT-1 visual examination of the containment penetration bellows will be performed using enhanced techniques qualified for detecting SCC, per NUREG-1611, Table 2, Item 12.	Prior to Period of Extended Operation
26	Enhance the Structures Monitoring Program to (1) Expand the program to include the following activities or components in the scope of License Renewal but not within the current scope of 10 CFR 50.65: (a) the steel electrical transmission towers required for the SBO and recovery paths; (2) Expand the parameters monitored during structural inspections to include those relevant to aging effects identified for structural bolting; and (3) Implement regularly scheduled ground water monitoring to ensure that a benign environment is maintained.	Prior to Period of Extended Operation
27	Develop and implement a Non-EQ Electrical Cables and Connection Program.	Prior to Period of Extended Operation

Nine Mile Point Unit 1		
ITEM	**COMMITMENT**	**SCHEDULE**
28	Enhance the Non-EQ Electrical Cable and Connections Used in Instrumentation Circuit Program to (1) Implement reviews of calibration or surveillance data for indications of aging degradation affecting instrument circuit performance. The first reviews will be completed prior to the period of extended operation and every ten years thereafter; and (2) In cases where a calibration or surveillance program does not include the cabling system in the testing circuit, or as an alternative to the review of calibration results described above, provide requirements and procedures to perform cable testing to detect deterioration of the insulation system, such as insulation resistance tests or other testing judged to be effective in determining cable insulation condition. The first test will be completed prior to the period of extended operation. The test frequency of these cables shall be determined based on engineering evaluation, but the test frequency shall be at least once every ten years.	Prior to Period of Extended Operation
29	Enhance the Preventive Maintenance Program to (1) Expand the PM Program to encompass activities for certain additional components, identified as requiring Aging Management. Explicitly define the aging management attributes, including the systems and the component types/commodities included in the program; (2) specifically list those activities credited for aging management; (3) specifically list parameters monitored (4) specifically list the aging effects detected; (5) establish a requirement that inspection data be monitored and trended; and (6) establish detailed parameter-specific acceptance criteria.	Prior to Period of Extended Operation
30	Enhance the System Walkdown Program to (1) Train all personnel performing inspections in the Systems Walk-down Program to ensure that age related degradation is properly identified and incorporate this training into the site training program; and (2) Specify acceptance criteria for visual inspections to ensure aging related degradation is properly identified and corrected.	Prior to Period of Extended Operation
31	Enhance the Non-Segregated Bus Inspection Program to (1) Expand visual inspections of the bus ducts, their supports and insulation systems; (2) Create new provisions to perform, as an alternative to either thermography or periodic low range resistance checks of a statistical sample of the bus ducts accessible bolted connections, a visual inspection for the connections that are covered with heat shrink tape, sleeving, insulating boots, etc.; and (3) Define acceptance criteria for inspection of the bus ducts, their support and insulation systems, and the low range ohmic checks of connections.	Prior to Period of Extended Operation
32	Develop and implement a Fuse Holder Inspection Program.	Prior to Period of Extended Operation

Nine Mile Point Unit 1		
ITEM	**COMMITMENT**	**SCHEDULE**
33	Enhance the Bolting Integrity Program to (1) The Structures Monitoring, Preventive Maintenance and Systems Walk-down Programs will be enhanced to include requirements to inspect bolting for indication of loss of preload, cracking, and loss of material, as applicable; (2) Include in NMP administrative and implementing program documents references to the Bolting Integrity Program and Industry guidance; and (3) Establish an augmented inspection program for high-strength (actual yield strength $ 150 ksi) bolts. This augmented program will prescribe the examination requirements of Tables IWB-2500-1 and IWC-2500-1 of ASME Section SI for high-strength bolts in the Class 1 and Class 2 component supports, respectively.	Prior to Period of Extended Operation
34	Enhance the Protective Coating Monitoring and Maintenance Program to (1) specify the visual examination of coated surfaces for any visible defects includes blistering, cracking, flaking, peeling, and physical or mechanical damage; (2) perform periodic inspection of coatings every refueling outage versus every 24 months; (3) set minimum qualifications for inspection personnel, the inspection coordinator, and the inspection results evaluator; (4) perform thorough visual inspections in areas noted as deficient concurrently with the general visual inspection; (5) specify the types of instruments and equipment that may be used for the inspection; (6) pre-inspection reviews of the previous two monitoring reports before performing the condition assessment; (7) establishment of guidelines for prioritization of repair areas and monitoring these areas until they are repaired; and (8) to require that the inspection results evaluator determine which areas are unacceptable and initiate corrective action.	Prior to Period of Extended Operation
35	Develop and implement a Non-EQ Electrical Cable Metallic Connections Inspection Program.	Prior to Period of Extended Operation

<table>
<tr><th colspan="3">Nine Mile Point Unit 1</th></tr>
<tr><th>ITEM</th><th>COMMITMENT</th><th>SCHEDULE</th></tr>
<tr><td>36</td><td>NMP is revising the commitment it made in its response to RAI 3.1.2-1 in NMP Supplemental Letter NMP1L 1928, dated 2/14/2005, as follows:

“As acknowledged by the NRC in the referenced RAI, the ASME Code Committee is evaluating the acceptability of roll/expansion techniques as a permanent repair for CRD stub tubes via Code Case N-730. NMP will continue to follow the status of the proposed ASME code case and will implement the final code case, as conditioned by the NRC, once it has been approved. If the code case is not approved by ASME, then NMP will seek NRC approval of the current draft of Code Case N-730 dated 10/19/05 on a plant specific basis as conditioned by the NRC.

During the period of extended operation, should a CRD stub tube rolled in accordance with the provisions of the code case resume leaking, NMP will implement one of the following zero leakage permanent repair strategies prior to startup from the outage in which the leakage was detected:

1. A welded repair consistent with BWRVIP-58A, “BWRVIP Internal Access Weld Repair” and Code Case N-606-1, as endorsed by the NRC in Regulatory Guide 1.147.

2. A variation of the welded repair geometry specified in BWRVIP-58A subject to the approval of the NRC using Code Case N-606-1.

3. A future developed mechanical/welded repair method subject to the approval of the NRC.”</td><td>August 22, 2009</td></tr>
<tr><td>37</td><td>Enhance the program to evaluate component susceptibility to loss of fracture toughness. Assessments and inspections will be performed, as necessary to ensure that intended functions are not impacted by the aging effect.</td><td>Prior to Period of Extended Operation</td></tr>
<tr><td>38</td><td>An EVT-1 examination of the NMP Unit 1 feedwater sparger end bracket welds will be added to the BWR Vessel Internals Program. The inspection extent and frequency of the end bracket weld inspection will be the same as the ASME Section XI inspection of the feedwater sparger bracket vessel attachment welds.</td><td>Prior to NMP Unit 1 Period of Extended Operation</td></tr>
<tr><td>39</td><td>The Masonry Wall Program (as managed by the Structures Monitoring Program) will be enhanced to provide guidance for inspecting NMP Unit 1 non-reinforced masonry walls that do not have bracing and are within scope of license renewal more frequently than the reinforced masonry walls.</td><td>Prior to NMP Unit 1 Period of Extended Operation</td></tr>
</table>

Nine Mile Point Unit 1		
ITEM	**COMMITMENT**	**SCHEDULE**
40	NMP Unit 1 will perform an EVT-1 inspection of the thermal shield to flow shield weld starting in 2007 and proceeding at a 10 year frequency thereafter consistent with the ISI inspection interval.	Prior to NMP Unit 1 Period of Extended Operation

Nine Mile Point Unit 2		
ITEM	**COMMITMENT**	**SCHEDULE**
1	Incorporate Appendix A2 into the UFSAR.	Following the issuance of the renewed Operating License
2	In accordance with 10 CFR 54.21(b), during NRC review of this application, provide an annual update to the application to reflect any change to the current licensing basis that materially affects the contents of the License Renewal Application (LRA).	December 31, 2005
3	Supporting analyses will be completed prior to the period of extended operation to confirm that the failure probabilities for the limiting RPV axial welds remain bounded for the period of extended operation.	Prior to Period of Extended Operation
4	For those locations where additional fatigue analysis is required to take advantage of the implicit margin, and to more accurately determine cumulative usage factor (CUFs), the EPRI FatiguePro fatigue monitoring software will be implemented prior to the period of extended operation.	Prior to Period of Extended Operation
5	For the critical reactor vessel component locations, shown in Table 4.3-4 of the LRA, additional usage will be added to the baseline Cumulative Usage Factor using one of the methods described in Section 4.3 of the LRA.	Prior to Period of Extended Operation
6	For the bounding locations for ASME Class 1 systems, transients contributing to fatigue usage will be tracked by the Fatigue Monitoring Program (FMP) with additional usage added to the baseline Cumulative Usage Factor (CUF) using the design Cycle Based Fatigue (CBF) method described in Section 4.3 of the LRA. If a bounding location with a current CUF value less than or equal to 0.1 could have its CUF value exceed 0.1 before the end of the period of extended operation, then the impact on the original break postulation calculations will be assessed.	Prior to Period of Extended Operation
7	Transients contributing to fatigue usage of the FWS nozzles will be tracked by the FMP with additional usage added to the baseline Cumulative Usage Factor using the Stress Based fatigue method described in Section 4.3 of the LRA.	Prior to Period of Extended Operation

Nine Mile Point Unit 2		
ITEM	**COMMITMENT**	**SCHEDULE**
8	If fatigue monitoring of ASME Class 1 piping (described in LRA Section 4.3.2) indicates higher fatigue usage than expected, non-ASME Class 1 piping will be evaluated for possible fatigue concerns.	Prior to Period of Extended Operation
9	Revise or evaluate the Cumulative Usage Factor evaluations for the shroud, core support plate and studs, and jet pumps to remove conservatism and/or encompass the period of extended operation (e.g., a more extensive fatigue analysis of the jet pumps will be performed).	Prior to Period of Extended Operation
10	Assess the impact of the reactor coolant environment on a sample of critical component locations, including locations equivalent to those identified in NUREG/CR-6260, as part of the Fatigue Monitoring Program. These locations will be evaluated by applying environmental correction factors (F_{en}) to existing and future fatigue analyses.	Prior to Period of Extended Operation
11	For penetrations listed in Table 4.6-4 of the LRA, transients contributing to fatigue usage will be tracked by the NMPNS FMP with additional usage added to the baseline Cumulative Usage Factor using the design Cycle Based Fatigue method described in Section 4.3 of the LRA.	Prior to Period of Extended Operation
12	NMPNS will either:(1) Install core plate wedges (as part of a proposed core shroud tie-rod repair) to eliminate the need for the enhanced inspections of the core plate hold-down bolts recommended by BWRVIP-25; or (2) Perform an analysis (incorporating detailed flux/fluence analyses and improved stress relaxation correlations) in accordance with BWRVIP-25 to demonstrate that the core plate hold-down bolts can withstand all normal, emergency, and faulted loads considering the effects of stress relaxation, until the end of the period of extended operation and submit it for staff review and approval 2 years prior to entering the period of extended operation.	October 31, 2024

Nine Mile Point Unit 2		
ITEM	**COMMITMENT**	**SCHEDULE**
13	Enhance the BWR VIP to address (1) BWRVIP-18, 41 and 42 open items regarding the inspection of inaccessible welds for core spray, jet pump and low pressure coolant injection components, respectively. As such, NMPNS will implement the resolution of these open items as documented in the BWRVIP response and reviewed and accepted by the NRC; (2) The inspection and evaluation guidelines for steam dryers and access hole covers are currently under development by the BWRVIP committee. Once these guidelines are documented, and reviewed and accepted by the NRC, the actions will be implemented in accordance with the BWRVIP program; (3) The baseline inspections recommended in BWRVIP-47 for the BWR lower plenum components will be incorporated into the appropriate program and implementing documents; and (4) NMPNS will perform inspections of the guide beams similar (in inspection methods, scope and frequency of inspection) to the inspections specified in BWRVIP-47, “BWR Lower Plenum Inspection and Flaw Evaluation Guidelines,” for the control rod guide tube components. The extent of examination and its frequency will be based on a ten percent sample of the total population, which includes all grid beam and beam-to-crevice slots, being inspected within 12 years of entry into the period of extended operation with five percent of the population being inspected within the first six years. The sample locations selected for examination will be in areas that are exposed to the highest neutron fluence. The top guide grid beam reinspection requirements will depend on the inspection results; however, at a minimum, the NMP BWRVIP program will follow the same guidance for the subsequent 12 year interval as defined for the initial 12 year baseline.	Prior to Period of Extended Operation
14	Enhance the Open Cycle Cooling Water System (OCCWS) to (1) Ensure that the applicable commitments made for GL 89-13, and the requirements in NUREG-1801, Section XI.M20 are captured in N2-TDP-REL-0104, “GL 89-13, Service Water System Problems Affecting Safety Related Equipment Program Plan”; (2) Incorporate into the OCCWS program, the requirements of the NUREG-1801, Section XI.M20 that are more conservative than the GL 89-13 commitments; and (3) Revise the preventive maintenance and heat transfer performance test procedures to incorporate specific inspection criteria, corrective actions, and frequencies.	Prior to Period of Extended Operation

Nine Mile Point Unit 2		
ITEM	**COMMITMENT**	**SCHEDULE**
15	Enhance the Closed Cycle Cooling Water System (CCCWS) Program to (1) Expand periodic chemistry checks of the system consistent with the guidelines of EPRI TR-107396; (2) Implement a program to use corrosion inhibitors in the Reactor Building Closed Loop Systems (RBCL) and Control Building Ventilation Chilled Water System (CBVCWS) in accordance with the guidelines given in EPRI TR-107396; (3) Direct periodic inspections to monitor for loss of material in the piping of the CCCW systems; (4) Establish the frequencies to inspect for degradation of components in CCCWS, including heat exchanger tube wall thinning; (5) Establish periodic monitoring, trending, and evaluation of performance parameters for the RBCL Cooling and CBVCWS; (6) Specify chemistry sampling frequency for the CBVCWS; (7) Provide the controls and sampling necessary to maintain water chemistry parameters in CCCWS within the guidelines of EPRI Report TR 107396; and (8) Ensure acceptance criteria are specified in the implementing procedures for the applicable indications of degradation.	Prior to Period of Extended Operation
16	Revise applicable procedures related to the Crane Inspection Program to add specific direction for performance of corrosion inspections, with acceptance criteria, for certain hoist lifting assembly components.	Prior to Period of Extended Operation
17	Enhance the Fire Protection Program to (1) Incorporate periodic visual inspections of piping and fittings located in a non-water environment such as Halon and Carbon Dioxide fire suppression systems components, to detect evidence of corrosion and any system mechanical damage that could affect its intended function; (2) Expand the scope of periodic functional tests of the diesel-driven fire pump to include inspection of engine exhaust system components to verify that loss of material is managed; (3) Perform an engineering evaluation to determine the plant specific inspection periodicity of fire doors; and (4) Revise Halon and Carbon Dioxide Functional test frequencies to semi-annual.	Prior to Period of Extended Operation

Nine Mile Point Unit 2		
ITEM	**COMMITMENT**	**SCHEDULE**
18	Enhance the Fire Water System Program by revising applicable existing procedures to (1) incorporate inspections to detect and manage loss of material due to corrosion into existing periodic test procedures; (2) specify periodic component inspections to verify that loss of material is being managed; (5) measure fire protection system piping wall thickness using non-intrusive techniques (e.g., volumetric testing) to detect loss of material due to corrosion; (6) establish an appropriate means of recording, evaluating, reviewing, and trending the results of visual inspections and volumetric testing; and (7) Define acceptance criteria for visual inspections and volumetric testing; and (8) Develop new procedures and PM tasks to implement sprinkler head replacements and/or inspections to meet National Fire Protection Association (NFPA) 25, "Inspection, Testing, and Maintenance of Water Based Fire Protection Systems," Section 5.3.1 (2003 Editions) requirements.	Prior to Period of Extended Operation
19	Enhance the Fuel Oil Chemistry Program to (1) Provide guidelines for the appropriate use of biocides, corrosion inhibitors, and/or fuel stabilizers to maintain fuel oil quality; (2) Add a requirement to sample the diesel fuel oil storage tanks for water and sediment at least quarterly per the ASTM standard; (3) Add requirements to periodically inspect the interior surfaces of the fuel oil storage tanks for evidence of significant degradation, including a specific requirement that the tank bottom thickness be determined by UT or other industry recognized methods; (4) Add a requirement for quarterly trending of particulate contamination analysis results; (5) Ensure acceptance criteria are specified in the implementing procedures for the applicable indications of potential degradation; (6) Establish a requirement to perform quarterly trending of water and sediment; and (7) Establish a requirement to remove water, if found.	Prior to Period of Extended Operation

Nine Mile Point Unit 2		
ITEM	COMMITMENT	SCHEDULE
20	Enhance the Reactor Vessel Surveillance program to (1) Incorporate the requirements and elements of the Integrated Surveillance Program (ISP), as documented in BWRVIP-116 and approved by NRC, or an NRC approved plant-specific program into the Reactor Vessel Surveillance Program, and include a requirement that if NMPNS surveillance capsules are tested, the tested specimens will be stored in lieu of optional disposal. When the NRC issues a final safety evaluation report (SER) for BWRVIP-116, NMPNS will address any open items and complete the SER Action Items. Should BWRVIP-116 not be approved by the NRC, a plant specific reactor vessel surveillance program will be submitted to the NRC two years prior to commencement of the period of extended operation; and (2) Project analyses of upper shelf energy and pressure temperature limits to 60 years using methods prescribed by Regulatory Guide 1.99, Revision 2, and include the applicable bounds of the data, such as operating temperature and neutron fluence.	Prior to Period of Extended Operation
21	Develop and implement a One-Time Inspection Program, which also includes the attributes for a selective Leaching of Materials Program.	Prior to Period of Extended Operation
22	Develop and implement a Buried Piping and Tank Inspection Program which includes a requirement that before entry into the period of extended operation, if an opportunistic inspection has not occurred, NMPNS will excavate NMP Unit 2 degradation susceptible areas to perform focused inspections.	Prior to Period of Extended Operation
23	An augmented VT-1 visual examination of the containment penetration bellows will be performed using enhanced techniques qualified for detecting SCC, per NUREG-1611, Table 2, Item 12.	Prior to Period of Extended Operation
24	Enhance the Structures Monitoring Program to (1) Expand the program to include the following activities or components in the scope of License Renewal but not within the current scope of 10 CFR 50.65: (a) Fire Rated Assemblies & Watertight Penetration Visual Inspections (b) masonry walls in the Turbine Building and Service Water Tunnel serving a fire barrier function (c) the steel electrical transmission towers required for the SBO and recovery paths; (2) Expand the parameters monitored during structural inspections to include those relevant to aging effects identified for structural bolting; and (3) Implement regularly scheduled ground water monitoring to ensure that a benign environment is maintained.	Prior to Period of Extended Operation
25	Develop and implement a Non-EQ Electrical Cables and Connection Program.	Prior to Period of Extended Operation

Nine Mile Point Unit 2		
ITEM	COMMITMENT	SCHEDULE
26	Enhance the Non-EQ Electrical Cable and Connections Used in Instrumentation Circuit Program to (1) Implement reviews of calibration or surveillance data for indications of aging degradation affecting instrument circuit performance. The first reviews will be completed prior to the period of extended operation and every ten years thereafter; and (2) In cases where a calibration or surveillance program does not include the cabling system in the testing circuit, or as an alternative to the review of calibration results described above, provide requirements and procedures to perform cable testing to detect deterioration of the insulation system, such as insulation resistance tests or other testing judged to be effective in determining cable insulation condition. The first test will be completed prior to the period of extended operation. The test frequency of these cables shall be determined based on engineering evaluation, but the test frequency shall be at least once every ten years.	Prior to Period of Extended Operation
27	Enhance the Preventive Maintenance Program to (1) Expand the PM Program to encompass activities for certain additional components, identified as requiring Aging Management. Explicitly define the aging management attributes, including the systems and the component types/commodities included in the program; (2) specifically list those activities credited for aging management; (3) specifically list parameters monitored; (4) specifically list the aging effects detected; (5) establish a requirement that inspection data be monitored and trended; and (6) establish detailed parameter-specific acceptance criteria.	Prior to Period of Extended Operation
28	Enhance the System Walkdown Program to (1) Train all personnel performing inspections in the Systems Walkdown Program to ensure that age related degradation is properly identified and incorporate this training into the site training program; and (2) Specify acceptance criteria for visual inspections to ensure aging related degradation is properly identified and corrected.	Prior to Period of Extended Operation
29	Enhance the Non-Segregated Bus Inspection Program to (1) Expand visual inspections of the bus ducts, their supports and insulation systems; (2) Create new provisions to perform, as an alternative to either thermography or periodic low range resistance checks of a statistical sample of the bus ducts accessible bolted connections, a visual inspection for the connections that are covered with heat shrink tape, sleeving, insulating boots, etc.; and (3) Define acceptance criteria for inspection of the bus ducts, their support and insulation systems, and the low range ohmic checks of connections.	Prior to Period of Extended Operation
30	Develop and implement a Fuse Holder Inspection Program.	Prior to Period of Extended Operation

Nine Mile Point Unit 2		
ITEM	**COMMITMENT**	**SCHEDULE**
31	Enhance the Bolting Integrity Program to (1) The Structures Monitoring, Preventive Maintenance and Systems Walk-down Programs will be enhanced to include requirements to inspect bolting for indication of loss of preload, cracking, and loss of material, as applicable; (2) Include in NMP administrative and implementing program documents references to the Bolting Integrity Program and Industry guidance; and (3) Establish an augmented inspection program for high-strength (actual yield strength $ 150 ksi) bolts. This augmented program will prescribe the examination requirements of Tables IWB-2500-1 and IWC-2500-1 of ASME Section SI for high-strength bolts in the Class 1 and Class 2 component supports, respectively.	Prior to Period of Extended Operation
32	Enhance the Protective Coating Monitoring and Maintenance Program to (1) specify the visual examination of coated surfaces for any visible defects includes blistering, cracking, flaking, peeling, and physical or mechanical damage; (2) perform periodic inspection of coatings every refueling outage versus every 24 months; (3) set minimum qualifications for inspection personnel, the inspection coordinator, and the inspection results evaluator; (4) perform thorough visual inspections in areas noted as deficient concurrently with the general visual inspection; (5) specify the types of instruments and equipment that may be used for the inspection; (6) pre-inspection reviews of the previous two monitoring reports before performing the condition assessment; (7) establishment of guidelines for prioritization of repair areas and monitoring these areas until they are repaired; and (8) to require that the inspection results evaluator determine which areas are unacceptable and initiate corrective action.	Prior to Period of Extended Operation
33	Develop and implement a Non-EQ Electrical Cable Metallic Connections Inspection Program.	Prior to Period of Extended Operation
34	Develop and implement a Wooden Power Pole Inspection Program.	Prior to Period of Extended Operation
35	Enhance the program to evaluate component susceptibility to loss of fracture toughness. Assessments and inspections will be performed, as necessary to ensure that intended functions are not impacted by the aging effect.	Prior to Period of Extended Operation
36	The spent fuel rack design that currently utilizes Boraflex for reactivity control in the spent fuel pool will be replaced by a design that utilizes Boral for this function.	Prior to NMP Unit 2 Period of Extended Operation

Nine Mile Point Unit 2		
ITEM	**COMMITMENT**	**SCHEDULE**
37	An EVT-1 examination of the NMP Unit 2 feedwater sparger end bracket welds will be added to the BWR Vessel Internals Program. The inspection extent and frequency of the end bracket weld inspection will be the same as the ASME Section XI inspection of the feedwater sparger bracket vessel attachment welds. If the final fabrication review of NMP Unit 2 feedwater thermal sleeve concludes that the hidden welds are not IGSCC susceptible, the NMP Unit 2 inspections will be discontinued.	Prior to NMP Unit 2 Period of Extended Operation
38	Enhance the Inaccessible Medium-Voltage Cables not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program as follows: (1) Expand the scope of the existing procedures to provide for manhole inspections and water removal, (2) Develop a new testing procedure specific to those cables requiring aging management under this Program. The specific type of test performed will be a proven test for detecting deterioration of the insulation system due to wetting as described in EPRI TR-103834-P1-2, such as power factor, partial discharge, or other testing that is both state-of-the-art and consistent with the latest industry guidance at the time the test is performed. (3) establish requirement to test cables subject to aging management prior to, and every 10 years during, the period of extended operation, and (4) establish maintenance requirement to inspect and remove water, as necessary, from manholes serving cables subject to aging management. The inspection frequency will be based upon actual plant experience with water accumulation in the manhole, but in any event, will be at least once every two years. The first inspection will be completed prior to the period or extended operation.	Prior to NMP Unit 2 Period of Extended Operation